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The AUTOMOBILE and Automotive Industries

Vol. XXXVII
No. 5

NEW YORK, AUGUST 2, 1917

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Champion Spark Plug Co.
Toledo, Ohio

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Hupp Motor Car Corporation
Detroit Michigan USA

May 10 1917

The Van Sicklen Company
Elgin, Illinois

Attention Mr. E. H. Van Sicklen, Jr.

Gentlemen:-

The VAN SICKLEN SPEEDMETER deserves its share of credit for the successful completion of one of the most strenuous and difficult tours in recent years, viz: The HUPMOBILE CAPITAL 20 CAPITAL TOUR.

A standard, five passenger Hupmobile car equipped with a Van Sicklen Speedmeter, left Washington, D.C. August 28th, 1916, touring to the capital of every state in the United States of America, and returned to the National Capital January 9th, 1917.

Words cannot express our appreciation of the faithfulness shown by the Van Sicklen Speedmeter in guiding us over all roads, good, bad and indifferent, as typified by wonderful mountain passes filled with snow, desert trails, and rain swept country; the greatest extremes of weather---the hottest of summer days to thirty degrees below zero, and at all times dependent on Van Sicklen accuracy to keep us supplied with fuel, water and provisions. Our mileage tallied in every instance with that recorded in our "Blue Book".

We attained our goal, covering 20,019 miles without a mishap, and are glad to be able in this small way to praise "VAN" which we counted as one of the crew, rather than a remarkable piece of mechanism.

Very truly yours,

HUPP MOTOR CAR CORPORATION
Captain Hupmobile United States Tour

CEH-C

"From hottest of Summer days to 30 degrees below zero*** Our mileage tallied in every instance with that recorded in our Blue Book."

Catalog of Van Sicklen Speedmeters mailed on request.

The Van Sicklen Company — Elgin Illinois *Factory — Elgin National Watch Co.*

The Automobile and Automotive Industries

VOL. XXXVII NEW YORK—THURSDAY, AUGUST 2, 1917—CHICAGO No. 5

Room for More Motorcycles

Value of Motorcycle Not Appreciated in America—Will Low Maintenance Cost Bring It Into Its Own in Future?

By A. Ludlow Clayden

AMERICA is the only country in the world where automobiles are used extensively that has so small a proportion of motorcycles in the total of self-propelled vehicles. To European visitors the comparative absence of motorcycles from our roads is a never-ending source of surprise and no man with a wide experience of both motorcycles and automobiles can escape the conviction that there is something wrong somewhere. To give the motorcycle the least favorable case, it can be stated with positive assurance that for the use of two people in fair weather the motorcycle and sidecar will give the same service as a two-seated car at not more than one-quarter the cost. For those who love speed it can only be surpassed by cars costing well up into the thousands of dollars, and it is a little-realized fact that a sidecar is vastly more comfortable than the majority of full-sized automobiles.

Motorcycle Combination Very Handy

Nor is it all a matter of economy. The motorcycle combination is greatly more handy. It is more easily housed and much quicker to get in and out of a garage, it is less trouble to use for short distances than a car, especially in the neighborhood of cities, owing to its smaller size and consequent ability to work its way through traffic. It is for this reason that so very many fairly wealthy owners of cars in England and sundry other countries keep a motorcycle in addition to their cars. For touring or long journeys the latter is used, but for all the ordinary short journeys the motorcycle is called into play. Also the intense "life" of a motorcycle, its rapid getaway and its hill-climbing ability cause it to appeal strongly to the class of man who normally likes to use a powerful roadster.

It seems that this sort of customer has never, in America, had the virtues of the motorcycle made clear to him. Either the right sort of sales policy has not been followed or the appeal to the other class of rider has been made so strong that the well-to-do individual has been led to believe the motorcycle is beneath him.

On Plane with $2,000 Car

A good motorcycle and sidecar together may cost more than a cheap automobile in the first instance, but they cost so very much less to operate that men who can just scrape together the $400 or so are able to maintain the motorcycle without too great a drain on their incomes. On the average the motorcycles now being made are comparable in engineering quality and in workmanship with such cars as sell from $2,000 upward, which means that they are thoroughly durable and do not wear out all over in the way that some of the cheap automobiles will do in 10,000 miles of running. This means that depreciation is nothing like so rapid and also that a thorough overhaul which will render an old machine almost as good as new again is not prohibitively expensive.

It is for these reasons that men of strictly limited means have found motorcycles such good in-

vestments. Of course the capacity is limited to two full-grown people, but many thousands of men do not want anything larger; in fact the touring car which will hold five or more is rather apt to force entertainment expense upon the owner unless he fills it with his own family.

Larger Output Is Logical

For this reason there seems plenty of room for a motorcycle output greatly in excess of the present one. But there is another reason also why the market should be larger. So far, the popular motorcycle in America has been the big machine with some 15 brake-hp. and a weight between 300 and 400 lb. This, although more handy than a small car, is far from being a substitute for a pedal cycle; for men to use going to and from work in town or country, for very short distances employment the big motorcycle is still rather a massive vehicle. There has grown up in Europe a type weighing about 150 lb. and costing from $125 to $200, with about 2½ hp. available which has sold enormously.

It has been attempted to reproduce this in America, but so far the public has not appreciated the great usefulness of these little machines. The price does not stand in the way, as it is little more than is often paid for a talking-machine by a family of far from generous income. There ought to be an immense sale for a $100 motorcycle, and there is no reason why such a machine could not be produced. That it be well made and of good material is essential; low weight is so important that no indifferent workmanship can be allowed. Cheapness must be attained by smallness and lightness and by large quantity.

There is a great chance for someone to take hold of this proposition and turn out perhaps 100,000, perhaps 200,000, such machines within a couple of years. It is essentially a novelty and it would need to be handled on a new basis; particularly does it seem unlikely that the type of dealer that has been selling motorcycles is suitable, for the motorcycle dealer in the aggregate has missed his opportunity.

Automobile dealers are to be blamed for not taking a wider interest in their field in this respect, for any man who can successfully merchandise passenger cars, trucks and tractors can do as well with motorcycles if he gives himself time to grasp the size of the unexploited market for them.

To get the better grade of customer, to convince the man who can afford a full-size car that the motorcycle is also an attractive proposition, is work for a high grade of dealer with good business standing. There are many such handling motorcycles exclusively, but not nearly many enough for the size of the country. It needs to be driven home that selling motorcycles is much more like selling cars than pedal cycles. A bicycle is sold like any piece of merchandise which a department store can handle, but a motorcycle needs the follow-up of garage and supply facilities which are essential adjuncts to the automobile dealer's establishment. A motorcycle is merely a type of automobile with a special appeal to two or three classes of purchasers, and it is this that has not been recognized as it should be.

Temperature Measurements in Steel Furnaces

A TECHNOLOGIC paper on Temperature Measurements in Bessemer and Open Hearth Practice by George K. Burgess has been issued by the Bureau of Standards. At the present time no pyrometers are used in steel making, as a rule, the melter being guided by the appearance of the furnace and the behavior of the metal in the test mold and the sampling ladle. It has been suggested that much better results would be obtained if the temperatures could be more accurately controlled by pyrometric measurement or otherwise. Mr. Burgess has investigated this question and reaches these conclusions:

The problems of temperature measurement and pyrometric control of furnace casting and ingot teeming temperatures are shown to present no serious difficulties or uncertainties.

For this purpose the most satisfactory type of instrument is one of the optical pyrometers using monochromatic light and permitting observation from a distance of streams of metal.

It is shown that the necessary corrections to the observed optical pyrometer readings for emissivity of metal and oxides to give true temperatures are sufficiently well known, but there may be uncertainty in the case of liquid slags.

For streams of liquid iron or steel the most probable value of emissivity to take, with a pyrometer using red light of wave length $\lambda = 0.65\,\mu$, is $e = 0.40$, corresponding to a correction of 139 deg. for an observed temperature of 1500 deg. C. The value of e for liquid slags is usually about 0.65 but varies with composition of the slag. A table of emissivity corrections is included in the text.

Determination of the temperature of the charge of Bessemer converters is not deemed practicable by pyrometric methods.

The operation of the open-hearth furnace can be gaged by the pyrometer, it being possible to control readily the temperature of the roof and of the bath of metal and slag by observations taken through ports, and the temperature of the metal may be had at any instant, with a fair degree of exactness, by observation with the optical pyrometer of the surface of 50 lb. of metal removed in a spoon. This operation is more certain with acid than with basic practice, the basic slag being more difficult to remove.

The temperatures of the roof of an open-hearth furnace are shown to bear no necessary relation to that of the metal bath, which again is shown may have zones of considerable differences in temperature, depending upon the operation of the furnace.

The temperature of the roof of an open-hearth furnace, dependent upon the firing practice, may vary very rapidly and within wide limits, 1550 to 1750 deg. C. The temperature of the open-hearth bath is usually kept between 1600 and 1670 deg. C.

There appears to be a remarkable degree of uniformity in casting temperatures actually acquired by the melters in practice. Thus, for nineteen consecutive Bessemer heats the teeming temperatures of the ingots were all between 1500 and 1555 deg. C., and a similar degree of concordance, although at slightly higher temperatures, was found in the open-hearth practice of several mills.

It is believed that a continuous, systematic following of the temperature by the methods above outlined for the various furnace and casting practices on the part of steel and iron mills would show the possibility of improvements and greater certainty of production in quality of product; also changes and the effects of variation in ingot or furnace practice could undoubtedly be carried out with greater certainty than at present appears to be the case.

50 Automotive Engineers Aid Government

Experts Volunteer Services in Washington for Indefinite Period—When Main Details Are Settled 15 or 20 Men Will Suffice To Carry Work Through

FOLLOWING the meeting in Columbus, July 21, Capt. William M. Britton, on returning to Washington, commenced making arrangements for the accommodation of the engineers who had volunteered their services for the completion of the design of the standard military motor trucks. On Saturday, July 28, telegrams were sent out by Quartermaster General Sharpe summoning to Washington on July 30 fifty engineers in accordance with the following list:

CHASSIS

Kalb, Lewis B., Kelly-Springfield Motor Truck Co., Springfield, Ohio.
Masury, A. F., International Motor Co., 64th St. & West End Ave., N. Y.
Myers, Cornelius T., 117 W. Fort St., Detroit, Mich.
Austin, Ralph W., Gramm-Bernstein Motor Truck Co., Lima, Ohio.
Dorris, George P., Dorris Motor Car Co., St. Louis, Mo.
Taylor, Cecil, Republic Motor Truck Co., Alma, Mich.
Martin, A. H. Kissel Motor Car Co., Hartford, Wis.
Guernsey, Chas., Service Motor Truck Co., Wabash, Ind.
Rose, C. B., Velie Motors Corp., Moline, Ill.
Shumard, E. C., United States Motor Truck Co., Cincinnati, Ohio.
Norton, W. T., Jr., Selden Motor Vehicle Corp., Rochester, N. Y.
Johnson, W. H., Dart Motor Truck Co., Waterloo, Iowa.
Wemp, Ernest E., Denby Motor Truck Co., Detroit, Mich.
Thomas, W. Owen, Thomas & Thomas, 870 Woodward Ave., Detroit, Mich.
Winther, M. P., Winther Motor Truck Co., Kenosha, Wis.
Wollensak, Arthur C., Sterling Motor Truck Co., Milwaukee, Wis.
Church, H. D., Packard Motor Car Co., Detroit, Mich.
Younger, John, Pierce-Arrow Motor Car Co., Buffalo, N. Y.

ELECTRICAL EQUIPMENT

Conrad, F., Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.
Libby, A. D. T., Splitdorf Electrical Company, Newark, N. J.
Chryst, W. A., Dayton Engineering Laboratories Co., Dayton, Ohio.
Bijur, Joseph, Bijur Motor Lighting Co., River Front & 16th, Hoboken, N. J.
Timmerman, A. H., Wagner Electric Mfg. Co., St. Louis, Mo.
Replogle, J. B., Remy Electric Co., Anderson, Ind.
Conklin, O. F., Remy Electric Co., Anderson, Ind.

AXLES

(Worm)

Carlson, G. W., Timken Detroit Axle Co., Detroit, Mich.
Laycock, A. M., Sheldon Axle & Spring Co., Wilkes-Barre, Pa.

(Internal Gear)

Russel, A. W., Russel Axle Co., North Detroit, Mich.
Fries, R. E., Columbia Axle Co., Cleveland, Ohio.
Torbensen, V. V., Torbensen Axle Co., Cleveland, Ohio.

(Double Reduction)

Clark, Mr., The Autocar Co., Ardmore, Pa.
Masury, A. F., International Motor Car Co., 64th St. & West End Ave., N. Y.

ENGINES

Horning, H. L., Wisconsin Motor Co.
Milbrath, A. F., Wisconsin Motor Co., West Allis, Wis.
Ballough, Chas., Hercules Motor Co., Canton, Ohio.
Hinkley, Chas., Hinkley Motor Co., Detroit, Mich.
Weinhart, Chas., Continental Motor Co., Detroit, Mich.
Broege, Chas., Buda Motor Co., Harvey, Ill.
Fisher, James, Waukesha Motor Co., Waukesha, Wis.

SPRINGS

Newkirk, Walter M., William & Harvey Rowland, Inc., Frankford, Philadelphia, Pa.

GENERAL

Clayden, A. L., Engineering Editor, THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES.

It is not expected that all of these men will be asked to remain until the designs are complete or even nearly complete. When the general nature of all the details is decided probably not more than fifteen to twenty men will be required to see the work through.

Arrangements have been made for the accommodation of 100 or more draftsmen, tracers, etc., and many manufacturers have offered their utmost assistance. The Continental Motor Co., for example, placed at the Government's disposal its entire drafting-room staff and equipment, an offer which was promptly accepted.

It was found to be impossible to allow expenses to these engineers owing to the rules under which the Quartermaster's Department is compelled to operate. The rate of pay, however, has been fixed. Sixteen dollars per day for each of the engineers, which will considerably more than cover expenses in the case of those who remain in Washington for any length of time, working out as it does to $4,800 per year. The engineers are only out to give such time as they can spare from their own business, but the draftsmen will, of course, be retained permanently as long as the job lasts. It seems likely that about a quarter of the engineers will give their whole time for 3 or 4 weeks, the remainder being called in occasionally when the others feel that they would like to hold a consultation.

When the designs are finally completed it is planned to submit them to a large general conference somewhat of the nature of those held in Columbus, it being desired to obtain the maximum amount of constructive criticism before any actual manufacture is proceeded with.

Refining Machine Shop Practice

IT is generally admitted that the requirements of automobile manufacture have greatly increased precision in machine construction. Formerly, when two parts of a machine had to be a close fit to each other, they were generally individually fitted; that is, one was first machined to size and then the other was turned down or bored out until it fitted the former with the desired degree of freedom or tightness. This plan is not practical in quantity production, and to make it possible to produce parts in quantity to such close limits that any part of one kind would fit any part of another kind with the necessary degree of accuracy, limit gages were introduced. These found their first general application in automobile manufacture. However, the use of such gages alone does not indicate the degree of precision which has to be worked to. This is determined by the tolerances allowed or the difference in the dimensions of the "go" and the "no go" ends of the gage. In automobile manufacture all tolerances have to be small, as any looseness produces noise and accelerates wear. In recent years there has been much rivalry, especially between makers of high grade cars, to make their machines as silent in operation as possible, and this has led to the cutting down of tolerances.

Airplane Engine To Refine Practice

Airplane engine manufacture is sure to further refine machine shop practice, though the underlying conditions calling for close limits are somewhat different. Silent operation is a small factor. But every ounce of surplus weight is objectionable. Therefore, all the parts of the engine must be machined down to the smallest permissible section and looseness in joints must be scrupulously eliminated, as it increases the strains on the parts.

Much Accomplished on Tractor Standardization

Big Program Ready for Engineers Who Will Gather at National Demonstrations in Fremont, Neb., To Solve Details of Tractor Problems

ALTHOUGH the tractor standards division of the S. A. E. has not been long at work it has already accomplished a great deal which will be of extreme value to the tractor industry. A great extent of the previous S. A. E. standards are applicable to tractor work. All the wheel specifications, for example, are suitable, the yoke and rod ends, taper fittings, the various electric lighting standards, etc., but in other matters variations are necessary.

For example, some question has been raised as to whether the present S. A. E. standard bolts and nuts would be altogether satisfactory in tractor work. The opinion has been expressed that too many sizes of S. A. E. standard bolts and nuts are now used and that any action that could be taken to restrict the number of sizes used in any one tractor would be most desirable.

Height of Drawbar for Plowing

Then, again, such matters as the height of the drawbar for plowing, which is now fixed at 17 in., is entirely peculiar to tractor work. On this matter of drawbar it will also be necessary to design a standard attachment for connecting the drawbar with the implement to be pulled. At the next meeting of the standards division, which will be held at Fremont, Neb., Aug. 8, it is hoped to arrive at a standard design of clevis for use on all tractors or to those with a four-plow capacity. Sketch designs have been made and it only remains to agree upon precise dimensions.

Another matter which is peculiar to tractor engineering is the design of fan belts and pulleys. There is an idea prevalent that the fan on tractor engines will ultimately come to be driven by some form of piston gearing, eliminating the belt altogether, but meanwhile the standards committee think it advisable to encourage the use of large, flat belts. The reason for preferring the flat to a V belt is that the former can be replaced readily by any hardware store and a temporary repair of a broken flat belt is much more easily made than a repair for a V belt. It is a particularly important matter because no tractor can operate for more than a very short time without adequate air draft induced by a fan.

A feature in which there is at present very great variation in tractor production is the present design of wheels. The first part of a wheel to suggest itself as suitable for standardization is the rim which it is proposed to have punched in such a manner that standard driving lugs or studs can be made adaptable to any make of tractor. The possibility of standardizing wheels completely is being considered, but it does not seem likely that this will be possible in the near future. There seems, however, to be no reason why hubs should not be standardized to some extent nor why there should not be standard dimensions and widths which would allow wheels to be made more or less interchangeable than if the detail of the spokes, etc., were to vary.

S. A. E. Plug Not Ideal

Whether it be used for an airplane, a racing car or a tractor engine, it has lately become noticed that the S. A. E. standard spark plug is not as satisfactory as a slightly smaller plug, owing to the greater ease with which the small shell and small porcelain can be cooled. Not long ago the aeronautic division finally settled upon the adoption of the French and British metric standard size spark plug, which has a thread of nominally 18 mm. diameter. This it is now proposed to accept for tractor work. It is more than likely that this is the thin end of the wedge and that with tractors at one end of the scale and airplanes at the other, both using metric plugs, we may before long find the metric size a standard for automobiles as well. If so it would mark the first of the absolutely world-wide standards to be accepted. The following dimensions for spark plugs are recommended: Thread, 18 mm. and 1½ mm. pitch. Form of thread, international standard (same as U. S. standard, only with one-half as much truncation at root of thread). Gasket shoulder to end of shell, ⅝ in. A table of tolerances for 18-mm. spark-plug threads as reported to have been adopted by the (British) Engineering Standards Committee is:

DIMENSIONS OF SPARK-PLUG THREAD

	Maximum			Minimum		
Diameter	Mm.	Inches		Mm.	Inches	
Outside	17.975	0.70768	(0.708)	17.850	0.70275	(0.703)
Pitch	17.001	0.66933	(0.669)	16.876	0.66441	(0.664)
Root	15.864	0.62457	(0.625)	15.739	0.61964	(0.620)

DIMENSIONS OF TAPPED HOLE

	Maximum			Minimum		
Diameter	Mm.	Inches		Mm.	Inches	
Outside	18.325	0.72146	(0.721)	18.187	0.71603	(0.716)
Pitch	17.176	0.67622	(0.676)	17.051	0.67124	(0.671)
Root	16.201	0.63783	(0.638)	16.076	0.63291	(0.633)

Piston rings lately standardized for automobiles and trucks by the S. A. E. are under discussion. It seems that it may be questioned whether the

S. A. E. standard dimension are quite heavy enough for the severe conditions of tractor service. For airplane work fairly frequent renewal of piston rings may be expected and allowed for in the design, but this is not the case with the tractor. Thus it is possible that some standard dimensions for tractor engines and piston rings may be evolved which will give a heavier series than for cars.

Another S. A. E. standard which is considered inadequate for tractor work is that of carbureter flanges, because some of the kerosene carbureters are very heavy it is thought advisable to increase the strength of some of the large flanges. This matter is under discussion and no conclusion in connection with this has yet been reached. In respect to one of the most popular of all the S. A. E. standards the yoke and rod ends of the tractor and the truck are alike in requiring something heavier than the original S. A. E. standard. For this reason these standards will be extended up to 1-in. bend or even larger, maintaining the proportions of the smaller size now in almost universal use on passenger cars.

S. A. E. Magneto Base Dimensions Suitable

With respect to ignition, the tractor division has recommended that the standard S. A. E. magneto base dimensions are suitable. W. A. Frederick, chief engineer of the Continental Motors Corp., is working out a coupling suitable for use in connection with an impulse starter magneto and it is hoped that this may be standardized for use on aviation engines, truck engines and tractor engines. On tractors it is recommended that the shaft for driving the magneto be ¾ in. in diameter and the coupling whenever it is formed be keyed and pinned to the shaft.

Another purely tractor matter on which a standard is desirable is the belt's speed, so that makers of the implements which are to be driven by tractors will be able to supply a standard pull and will be tolerably sure that the implements will be driven at the correct speed. The tractor division recommends a belt speed of 2600 ft. per minute for tractor, and it is proposed to extend this recommendation to include belt width as well.

On the much-vexed question of tractor rating the standards committee recommends:

(a) That manufacturers rate their tractors by two ratings, drawbar and belt power, as determined below.

(b) That the drawbar rating shall be 80 per cent of the power the tractor is guaranteed to develop at the drawbar continuously for two hours, the tractor being in good condition and properly operated at rated engine speed; that the tests be taken on grounds sufficiently firm to give traction wheels good footing, preferably firm sod.

(c) That the belt-power rating shall be 80 per cent of the power the engine is guaranteed to deliver at the belt pulley continuous for two hours, the tractor being in good condition and properly operated at the rating engine.

It is also recommended that the rating be based upon a standard plowing speed of 2 1/3 m.p.h. The following is a list of S. A. E. standards which are settled to be applicable to tractor industry:

(Yoke and eye rod ends) adjustable yoke ends.
Plain yoke ends.
Rod ends.
Yoke and rod end pins.
Cotter pins.
Spark-plug shell.
Screws and bolts.
Large diameter thread standard
Lock washers.
Square broached fittings.
Taper fittings.
6 spline fittings.
10 spline fittings.
4 spline fittings.
Taper fittings with castle nuts.
Carbon steels.
Screw stock.
Steel castings.
Nickel steels.
Nickel chromium steels.
Chromium steels.
Chromium vanadium steels.
Silico-manganese steels.
Heat treatments.
Physical properties.
Babbitt metal.
Brass casting metals.
Cast manganese bronze.
Hard cast bronze.
Gear bronze.
Aluminum alloys.
Non-ferrous metal tubing.
Round tension test-specimen.
Flat tension test-specimen.
Shock test-specimen.
Gray-iron test-specimen.
Brinell hardness test.
Cold drawn seamless steel tubes
Bands and strips.
Brake linings.
Ball and roller bearings.
Roller bearings.
Disk-clutch flywheel housings.
Cone-clutch flywheel housings.
Flanges.
Large flanges.
Flared tube unions.
Flared tube ells and tees.
Throttle-lever throw.
Magneto dimensions.
Electric bulbs for ground-return systems.
Electric bulbs for insulated-return systems.
Bulbs and reflector labels.
Head-lamps.
License plates and brackets.
Location of numbers—weight of cars.
Gearshift positions.
Oversize cylinders.
Piston-ring grooves.
Storage battery instructions.
Electrical insulation requirement
Lead battery ratings.
Ground-return installations.
Fuse dimensions.
Insulated cable for gasoline cars.
Flexible steel tubing.
Leaf springs.

Other standards which are considered desirable for the tractor division, but which would not be handled by them are pulley and socket joints for magneto and carbureter control connections, larger sizes being required than those already recommended for passenger cars. Also steering gear and connecting-rods are considered to be standardized as far as possible, and it is believed that one standard or series of standards will be satisfactory for both truck and tractor use.

Standard Truck Engine Influence

Of course, it is almost certain that the standardization of a truck engine for military work is going to have an effect on the tractor industry because it is practically certain that the standard military truck motor will be copied widely from a tractor viewpoint. It has been planned by some of the truck engineers that the military requirements call for an engine really a little too powerful and a little too large for truck work. Such an engine, however, will not be either too large or too powerful for tractor driving. Also it is required that the military truck have actually a system which will permit a big engine to operate on a low gear of 50 to 1, and this is as low as any standard tractor. Thus, if the standard truck engine works out well the military service should do at least as well in a tractor.

—

NEXT WEEK

The Automobile
and
Automotive Industries
Will Publish
Full Report of Motorcycle Meeting
in Atlantic City Aug. 6

Motorcycle Men Plan Busy Session

Manufacturers and Engineers of Parts and Accessories, as Well as Makers of Complete Vehicles, To Be Well Represented at Atlantic City Convention

Program

Motorcycle and Allied Trades Interests' Convention at Atlantic City, N. J., Aug. 6-10

Monday, Aug. 6

2 p. m., registration; golf preliminaries.
3 p. m., committee meetings.
8 p. m., theater party, Keith's Garden Pier.

Tuesday, Aug. 7

10 a. m., joint get-together meeting of all associations and all ladies of convention at Belvidere, 11th floor.
10:30 a. m., association meetings, Cycle Parts and Accessories Association, Belvidere, 11th floor; Bicycle Manufacturers' Association, room 1132; Cycle Jobbers' Association, Club Room, 10th floor.
2 p. m., golf preliminaries.
3 p. m., reception for ladies in library, 8th floor.
4:30 p. m., official bathing hour.
8 p. m., dancing at Steeplechase Pier.

Wednesday, Aug. 8

10 a. m., joint meeting, United Cycle Trade Directorate Report, Belvidere, 11th floor.
12.30 p. m., official picture.
2:15 p. m., matinee theater party for ladies.
2.30 p. m., association meetings, adjourned, Cycle Parts and Accessories Association, Belvidere, 11th floor; Bicycle Manufacturers' Association, room 1132; Cycle Jobbers' Association, Club Room, 10th floor.
4.30 p. m., official bathing hour, Beach Athletic Meeting.
8.30 p. m., bowling tournament, Columbia Alleys, 2211 Boardwalk.

Thursday, Aug. 9

10 a. m., joint meeting adjourned from Wednesday.
2.30 p. m., championship baseball game between manufacturers and jobbers.
4.45 p. m., official bathing hour.
9 p. m., cabaret, dinner, buffet supper.

Friday, Aug. 10

10 a. m., joint meeting adjourned.
2 p. m., golf finals.

THE motorcycle engineers of the country will get together Aug. 6 at Atlantic City, N. J., to design the best motorcycle for military purposes, and to discuss the best way of helping the Government in the war. One thing that will be emphasized at the meeting will be the selection of trained drivers for these military motorcycles instead of ordinary enlisted men. To emphasize the impracticability of using inexperienced drivers a certain incident that occurred on the border recently may be brought up. There is a case there where it took three motorcycles to go 35 miles on account of inexperienced men, whereas an experienced driver would have gone through promptly on one motorcycle.

40,000 Motorcycles for War Department

It is expected that the Government will buy approximately 40,000 more motorcycles of the standardized type. The 5000 recently bought are nearly all alike in their construction and details.

At the meeting of the Military Motorcycle Standardization Committee the various items of motorcycle standardization recommended at a meeting held in New York City on June 28 will be discussed further and submitted for final action. Each chairman of a Division has been requested to bring with him ten blueprints of the standards recommended by that Division, together with the tracing from which the blueprints were made, so that any changes which may be decided upon at the meeting can be made at once on the tracing. The meeting of the committee will take place at the Traymore Hotel and will open sharply at 9:30 a. m. A prompt opening of the session is essential for the reason that the chairman of the committee will be obliged to leave Atlantic City 2 o'clock in the afternoon for the West. Following is a list of the divisions of the committee with their chairman:

Rims, Tires, Spokes and Spoke Nipples—R. F. Rogers of Rogers Mfg. Co., Chicago, Chairman. L. Ogden of the Cygnet Rearcar Co., Buffalo, N. Y., will prepare an accurate drawing and furnish blueprints showing the rim section and also the section of the depression for the nipple head. Drawings will also be submitted by him showing the spoke and nipple adopted at the last meeting.

Spark Plugs, Headlamp Mounting and Magneto Base—F. W. Schwinn, Excelsior Motor Mfg. Co., Chicago, Chairman. Blueprints of the headlamp-supporting bracket recommended at the June 28 meeting will be presented by Mr. Schwinn for final action. He will also make a further report on the matter of the magneto base as outlined in the minutes of the June 28 meeting.

Chains, Control, Clutch Pedal, Brake Pedal and Gear Shift—C. O. Hedstrom of the Hendee Mfg. Co., Springfield, Mass., Chairman.

Kick Starters, Oil and Grease Cups, Oil and Fuel Pipe Fittings and Cylinder Displacement—W. S. Harley, Harley-Davidson Motor Corp., Milwaukee, Chairman.

Since the last meeting of the Military Motorcycle Standardization Committee the Government has placed orders for 5000 motorcycles of current designs, and in some quarters this created the impression that the Gov-

ernment had reconsidered and perhaps given up standardization plans. This, however, is far from being the case. Manager Clarkson of the S. A. E. a few days ago was in communication with Captain Britton, engineer in charge of motor transportation, and Captain Britton informed him that the Government was just as anxious as ever to have motorcycles completely standardized and that the work be accomplished as quickly as possible. The standards so far proposed are only a beginning of the process of completely standardizing the motorcycle, but it is the plan first to dispose of these items before taking up new ones. Two other subjects that will naturally come up for standardization at an early date are wheel hubs and bearings. If these are standardized, and all the standards already proposed are adopted, any wheel from one motorcycle will be interchangeable for a similar wheel on another motorcycle. As an indication of the interest of the War Department in the standardization of motorcycles it may be pointed out that while Captain Britton will not be able to attend the meeting personally, he will have a representative in attendance with whom engineers and manufacturers may consult.

Summary of Standards Work

At the last meeting of the motorcycle manufacturers held under the auspices of the Society of Automotive Engineers at Washington, action was taken on subjects submitted for standardization at the previous meeting.

It was decided that all military motorcycle rims for front and rear wheels as well as side car and rear car be 28 by 3 in. clincher tires and have the standard C C section with forty spoke holes 17/64 in. diameter, suitable for receiving the standard ¼-in. nipple.

All military motorcycle tires for front and rear wheels as well as side car and rear car wheels be of the clincher type 28 by 3.

Repair spokes for front and rear wheels as well as side-car and rear-car wheels be as follows:

Length 10⅞ in. from neck of head to tip.
Total length of swedge 2 in.
Diameter of swedge 0.135 in.
Length of thread 1⅛ in.
Number of threads to inch 40.
Diameter of spoke 0.110.
Diameter of head swedge 0.135 in.

Standard nipples of the following dimensions are to be used on all spokes:

Length under head ⅞ in.
Thickness of head ⅛ in.
Diameter of head 11/32 in.
Slot in head 1/32 in.
Width of wrench surface 0.212 in.
Diameter of nipple ¼ in.
Length of wrench surface 9/32 in.

Counterbored to depth of 5/16 in. to permit spoke swedge of 0.135 in. to readily enter. Balance of nipple drilled and tapped for 0.135 in. swedge threads.

It was moved that 18 mm. plugs be carried with the height of plug above the threads being left open for further consideration.

Headlamp mounting lugs will have the following dimensions for military motorcycles:

Height of lug 1⅛ in.
Width of lug ¾ in.
Hole 25/64 in.

Minimum clearance from center of hole to lamp casing 11/32 in. radius.

The Headlamp Supporting Bracket Division moved that prongs of the following dimension be adopted as standard for military motorcycles:

Height of prong 1½ in.
Diameter of prong ⅜ in., threaded for 9/16 in., 24 threads to the inch, S. A. E. standard hex nut.

Military motorcycles driving chains will be of the roller type, ⅝-in. pitch, roller with ⅜-in. roller diameter .40 in.

It was moved that the throttle control on military motorcycles be of the handle-bar-grip type, placed on the right side and operate to open the throttle by twisting the top of the grip toward the center.

The spark control is to be of the grip type placed on the left side and arranged to advance the spark by turning top of the grip toward the center.

The clutch pedal on military motorcycles is to be placed on the left side and operate to release the clutch by pushing forward and down, clutching by reverse action.

The brake-pedal is to be placed on the right side and operate to apply the brake by pushing down.

It was moved that the gearshift lever handle be placed on the left side and be of the progressive type.

On account of some of the gearshifts operating by movement of the lever up and down, others forward and back with sometimes the high gear in front and sometimes the high gear in the rear, it is thought that the matter of further standardization will have to be in abeyance for the time being.

Kick starters on military motorcycles are to be of the folding pedal type and operate by pushing down and back. Starters cannot be confined to a definite side until further standardization takes place on engines.

Fuel and lubrication pipes on military motorcycles shall be 5/16 in. o. d. and the fittings shall be of soldiered type with a ½-in. nut, twenty threads, as per drawing.

The total cylinder displacement on military motorcycles shall be 61 cu. in.

The maximum spring load on a military motorcycle and side car shall not exceed 500 lb., including the operator. No load can be strapped or attached to any part of the frame of either the motorcycle or side car.

710 Lb. per Motorcycle

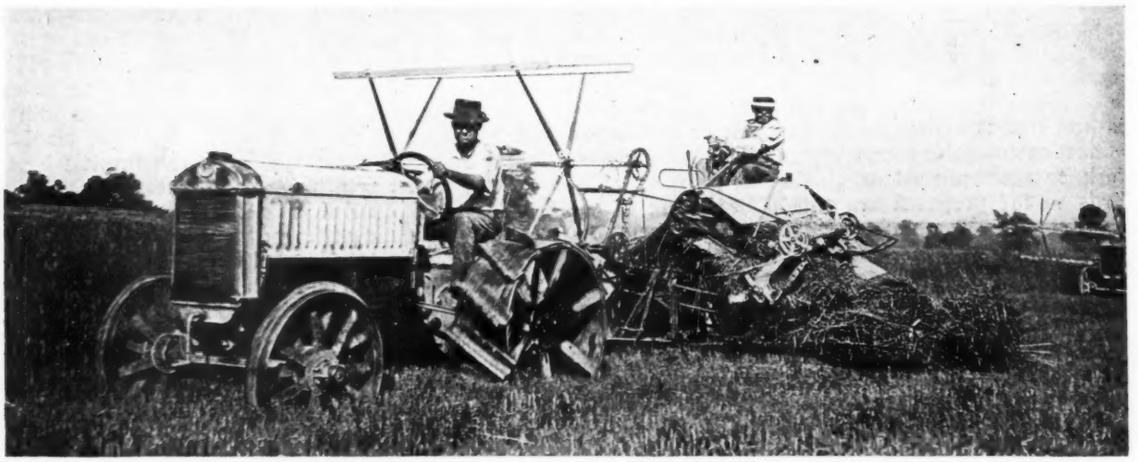
At the recent meeting of the Motorcycle Section of the Society of Automotive Engineers, T. W. Henderson stated that he had learned from the Ordnance Department that they were contemplating a load of 1421 lb. to be divided between two motorcycles. This would make a load of 710 lb. for a motorcycle, which is impossible to handle efficiently on present motorcycle construction.

At the same meeting Captain Britton said to the motorcycle engineers and manufacturers: "In a military motorcycle it is very essential that as many parts or units be made interchangeable as possible. At first sight there may not seem to be much opportunity for standardization but as the work of standardization progresses it is not unlikely that the field will broaden out and show many parts possible of standardization which previously looked impossible.

"This is an engineers' war, and our success depends on the ability of our engineers to design better machinery and devices than the enemy. Practically every device used in the war at the present time depends upon some engineering principle.

"There should ultimately be only one motorcycle and one truck. Your job is not finished until ultimate interchangeability of parts is obtained. You must always keep in mind the construction that has proven its ability to do the best and most constant work. New, untried internal detail construction is not wanted. Go as far as you can and as soon as you can in the standardization work.

"Pending the time when the approved military motorcycle is in production, the Government will purchase such high-grade machines as are at present procurable."



Ford tractor operating reaper on the experimental farm at Dearborn, Mich.

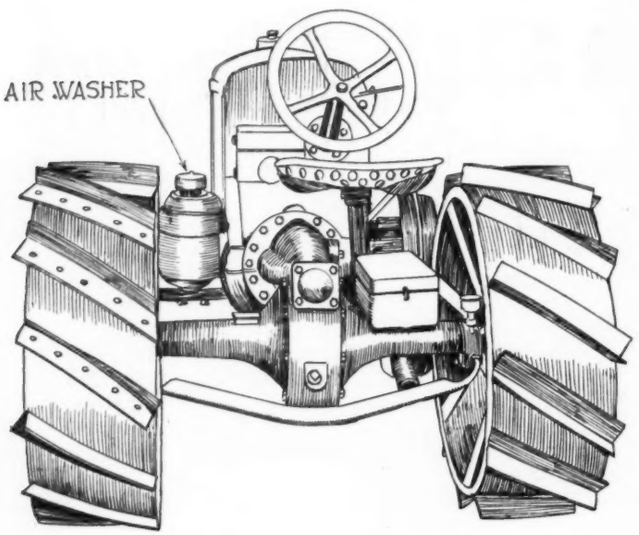
Ford Tractor Soon To Be Produced in Quantity

Experimental Machines Prove Success in Practical Work on 8000-Acre Farm

By J. Edward Schipper

DEARBORN, MICH., July 28—*Exclusive to* THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES.—On an 8000-acre farm embracing some of the most fertile land in this State, Henry Ford's tractor is giving daily evidence of its success. To-day eight of these tractors, each pulling a four-swath reaper and binder, each a four-horse load, are traveling up and down the rich wheat fields at a speed of 4 m.p.h., harvesting the crop of the great experimental farm.

In an adjacent field another tractor is busy taking in the hay and in still other fields other seasonable farming operations are taking place, and the crops which were sown by the aid of the Ford tractor are being gathered in great quantities.



Rear system of Ford tractor

In the center of the farm is the tractor factory and laboratory where the initial tractors have been built and where now great extensions are being added to take care of the quantity production which the world-demand for efficient farming tools is rendering necessary.

Across the water in Ireland another Ford factory is springing up just as rapidly as it is possible to put the materials together. The preliminary experimental stages have been passed by, and while there are a few little details to be cleared up, the Ford tractor is practically ready and only awaiting the facilities for production, before it will be actually at work in the fields.

All Ready for Production

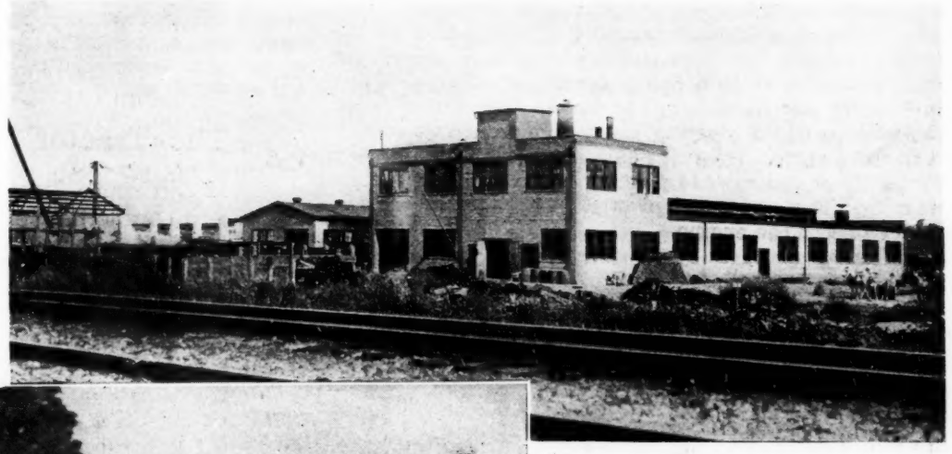
Around the Ford tractor plant at Dearborn the final touches are being put on the tractor and everything is being lined up to get speedily under way on production. New buildings are being added and there is almost no limit to the territory upon which the buildings can be expanded. At the present time it is intended to rush the plant here just as speedily as possible and to put it into production on a scale large enough to take care of both the foreign and domestic demand. It is planned to make the tractor the Ford car among tractors by turning out a tremendous output.

The Ford tractor will not be at the Fremont national demonstration this year. The reason given by the Ford company is that it is contrary to the Ford policy in the same way as it is to exhibit at the national automobile shows. Furthermore, any demand that could be created by exhibiting could not be taken advange of for the time being because of the necessity of shipping such a large quantity abroad.

While full details of the Ford tractor from an engi-

Above—New building for Dearborn tractor plant of Henry Ford & Son

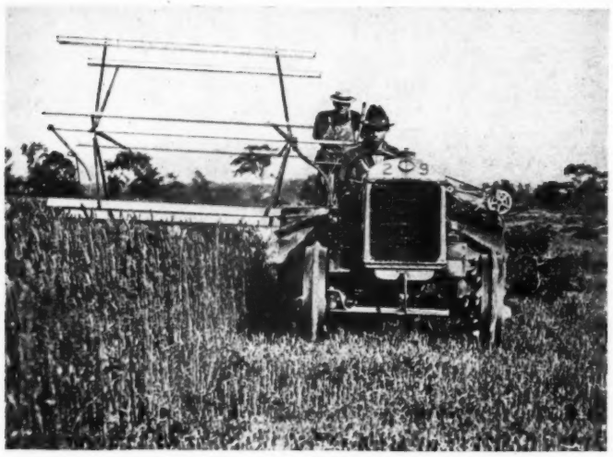
Right—One of the new tractor buildings now being constructed as an addition to the Ford tractor plant



Lower Right—Partial view of the tractor factory of Henry Ford & Son, now being rapidly enlarged

Below—Ford tractor at rest in a field. Note flanged rear wheels to give traction

Preparing To Build Ford Tractors in Quantity



Front view of Ford tractor operating a reaper on the experimental farm of Henry Ford & Son at Dearborn, Mich.

neering standpoint cannot be disclosed as yet, owing to the fact that there are many modifications possible before a real production program is entered into, the generalities of the machine are well known. The power plant is simply an enlarged edition of the model T engine used with such success in the passenger cars and trucks. The bore and stroke are larger, being in the neighborhood of 4 by 5 in. The carbureter is a Holley designed to start on gasoline and to run on kerosene, and the machine is fitted with the Holley air-washing device described in THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES.

In place of the planetary gearing there is a three-speed gearbox of the sliding selective type and the final drive is through a top worm. The clutch is a plate type and the entire drive from motor to the final worm is inclosed in a three-piece unit. The drive is extremely flexible on account of the three-point suspension of the entire vehicle. There is a trunnion support of the engine at the front end which rests on a built-up front axle. The front wheels carry a vertical flange down the center to assist in holding the tractor on the course intended through the medium of the steering gear. The front-axle section is in three parts. The front-axle alignment is maintained by a pair of radius rods forming an equilateral triangle with the front axle, and pivoted in a ball joint on the center line of the engine.

Lightness is secured by the absence of the heavy framework which generally characterizes tractor construction The solid unit layout of the drive casing furnishes a virtual box frame which gives all the rigidity desired and at the same time does not interfere with the flexibility that experts are agreed upon as being a necessary adjunct to a successful tractor.

Copper Scarce in England—Lead Supply Small

IN view of the unsatisfactory materials situation in this country, which is largely the result of heavy exports, the following editorial plea of *The Ironmonger* for an increased allowance of copper to British manufacturers for private industry should interest our purchasing agents and others:

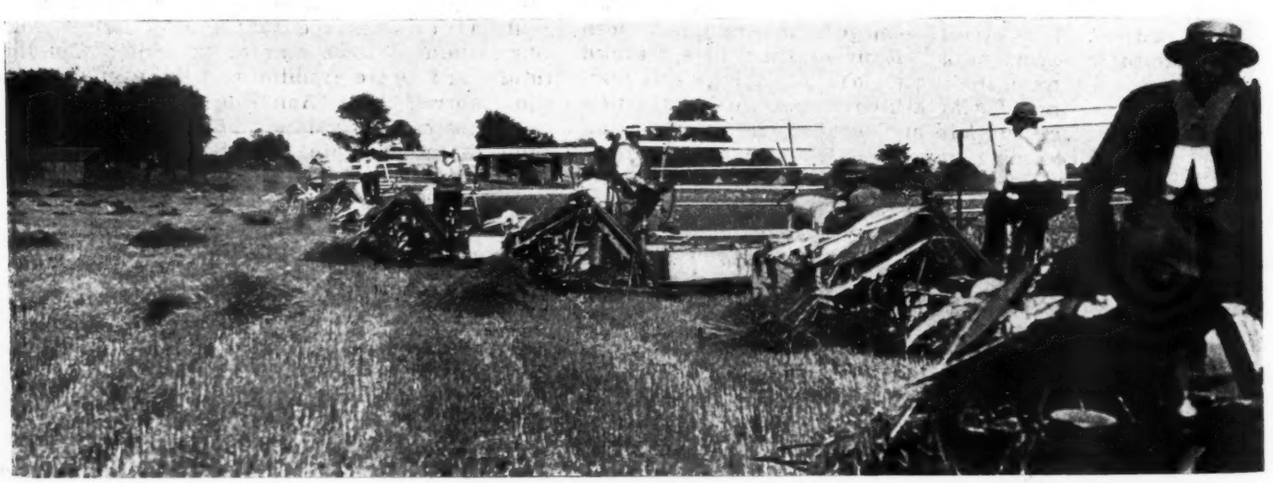
"When will manufacturers be allowed more copper for the carrying on of private industry? There is plenty of copper in the United States, and the space required for so much of it as would set most of our private engineering trade on its feet again would make no practical difference to the Atlantic transport problem. Efforts are being made to secure to the cotton trade a sufficiency of its natural aliment; and one-tenth or perhaps one-twentieth of the shipping space required for cotton would solve the copper difficulty.

"There is little room for doubt that enough copper is now being produced to keep going all the metal and mechanical industries outside the Central Empires, besides satisfying the war requirements of the Allies, and if that surmise is correct the time has come to press this fact upon those in authority. Much wealth is being lost through the holding up of such a great part of our engineering industry, and this at a time when the nation should be earning and saving every penny it can make, for the apparent prosperity the industrial nations are enjoying is mostly an illusion. We are living on our hump, like the camel, and our hump is getting small. Hard times are in store for the world, and every measure that tends to the restriction of trade will aggravate that hardship.

"The plea for more copper is only one of many that might be put forward in the metal trade. The supply of lead also calls for serious consideration by experts, and in a comparatively short time there may be need to plead the cause of consumers of foundry iron. Man does not live by war alone. The country has to live through the war and will have to live when peace returns, and it can live only by productive industries and by commerce."

The Tractor Demonstrations

at Fremont, Nebraska, will be Fully and Authoritatively Reported in the August 16 Issue of THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES



Seven Ford tractors cutting a wide swath on the experimental farm. Practically all the work is done by tractors

Future Problems in Export Trade

Manufacturers Must Take Advantage of Present Opportunity to Secure Firm Grasp on Foreign Fields—European Competition After War Will Be Strong—Planning Ahead Now Essential

By Tom O. Jones

Trade Commissioner of the Bureau of Foreign and Domestic Commerce

AT the present time, American motor vehicle manufacturers are considering more seriously than ever before the possibilities of the export trade. The United States has been fortunate in its motor export trade. Until the last few years the business has come to the companies rather in spite of themselves than because of any great efforts made to obtain it.

The first and most important feature in bringing this about, of course, was the low prices at which some of the American passenger cars were marketed. The war, shutting off the higher-priced European cars that were popular with the moneyed men in the European colonies and the Far East before the war, has been a big factor in bringing export trade to some of the higher-priced products.

EDITOR'S NOTE—Tom O. Jones, formerly advertising manager of the Empire Automobile Co., Indianapolis, was recently appointed trade commissioner of the Bureau of Foreign and Domestic Commerce and is now abroad, conducting the first of a series of investigations into the market for motor vehicles in various countries.

Generally, the manufacturers are coming to look upon the export trade as a great balance wheel, the factor of business which will allow them to keep up production during the months which are usually called the slow months in America, namely, October to March; for because of climatic conditions the trade is largely a year-around proposition in the Far East, and the tropics, and one that is at its height in the southern hemisphere during our slow season. What influence may be exerted by rainy seasons, etc., is usually such as to relieve the pressure of delivery requirements during what we know as the "rush months" in the American market.

Trained Export Men

To realize the increasing interest in the export trade it is only necessary to visit some of the representative factories. The export managers generally are men trained in export fields. Many of them have traveled abroad, not for motor lines alone, but for general merchandise. They display a keen interest in every article written on export trade, and, what is more to the point, they are succeeding in making the executives of their companies see the value of export trade, and in that way securing greater concessions than ever before. As proof of this fact we may note that in many of the larger factories the export sales are distinct and well-organized departments; some have their own staff of translators, several have sales representatives traveling continuously, and in some instances have mechanics abroad giving the needed service or instruction to native mechanics. As new men take up the work they are selected rather for a knowledge of trade conditions abroad than for familiarity with automobile manufacture.

The one point that seems most neglected is that of advertising abroad. I do not recall at the present time one automobile manufacturer who is making any special effort to handle his export advertising with the same efficiency and care that he exerts in the American publications. One tire company has established an export advertising department, prepares special cuts for various territories, and is going into the subject in a scientific manner, and, although the department is comparatively new, declares that results are already evident.

While some of the larger companies are sending mechanics abroad to give the service required, or to instruct native mechanics in caring for their cars, there is still much to be desired along this line, and the solution of the problem will mean much to the general development of the trade. As proof that the matter of service is considered of vital importance, it is interesting to note that one of the manufacturers of high-priced cars is refusing to appoint dealers, or even to ship cars to private owners, in territories in which there is no directly affiliated organization with trained mechanics prepared to give intelligent service on its make of car.

Under present conditions it is almost impossible to determine just which territories are producing the best results right now, or offer the greatest possibilities for the future. Embargoes and restrictions in regard to the use of passenger cars and gasoline, prohibitive duties or shipping conditions, practically shut all cars out of England, France, India, Singapore, Ceylon, Denmark, Holland, Norway, Sweden and Russia.

The greatest territories left, therefore, are: The Far East, where trade holds up well; the Dutch East Indies, where American cars, through their present monopoly, are being taken in larger numbers than ever before; South Africa, where the trade is below normal; Australia, where there is some fear of an embargo in the near future, and where conditions in the number of cars on hand worried some American companies not so very many months ago; and South America, which many companies have endeavored to enter with only fair success, and which they now seem to consider to have been an overrated market soon after the beginning of the world war.

Freight Rates Are High

It must be borne in mind, too, that there are tremendous difficulties facing every manufacturer in the shipment of his cars abroad, and where shipping facilities are available freight rates are so very high that the price of the car, in many instances, is increased nearly 100 per cent.

In the foregoing no account is taken, of course, of the prevailing conditions in America. The materials market, at its present level, is forcing price increases that bring

car costs back to the level of several years ago, offsetting to a great extent the savings made possible by perfected machinery and more efficient production methods.

Manufacturers generally admit a decrease in orders since the entry of the United States into the war, but feel confident that conditions will readjust themselves naturally in the near future, with a definite decision as to taxation and solutions of other economic problems. We can therefore look for the usual announcement of new models in the late summer and early fall, but it is fair to conclude that these announcements will not show any great changes in construction, while prices generally will be higher than in the 1917 models, rather than lower.

Getting Ready for After the War

With these conditions the American manufacturer sees his way clear to do his preliminary work for after-the-war trade abroad.

There is at least a fair working knowledge of trade methods in most of the foreign markets. Russia, however, is a field in which every one is interested, and sees possibilities of great business, at the same time admitting an entire lack of knowledge as to methods of entering the market. The Far East has taken a large number of American cars, and in that field the companies doing the largest export business are well represented as far as location of dealers is concerned. India, before the embargo was imposed, was a most favored field, and is looked upon as one of the most favorable potential markets after the war. Australasia and South Africa should take a considerable number of cars. In fact, these two markets grouped would probably be generally classed as one of the best after-the-war possibilities. South America still remains an unknown quantity. Scandinavia will be a good field; England is expected to be as large a customer after the war as before, even though tariffs are looked for that will considerably increase prices over those possible in days of free trade.

Must Meet Foreign Competition

As for the steps that American manufacturers must take to secure after-the-war trade: Heretofore we have enjoyed a monopoly of the low-priced-car business of the world, and since the war have secured a larger share of high-priced-car trade, although manufacturers of cars in this class do not seem to care seriously for this business, if we are to judge by the fact that many still refuse to furnish right drive, or cannot change over because of present design. Throughout the trade to-day we hear rumors of the possibility of European cars being produced to sell at much lower prices than was general before the war; in other words, there seems to be a well-founded idea that the European manufacturers, convinced of the popularity of the low-priced American car, not only in their colonies but even in the home countries of Europe itself, are seeking to hold the income of this trade in their own territories.

What Europe Will Do

If such a plan is to be followed, European manufacturers will have the advantage of labor-saving machinery, with which they have become familiar, and with which they are well equipped by its general importation from America for the purposes of munition manufacture, while European manufacturers cannot hope to better to any great extent in dollar-for-dollar values the mechanical excellence of the low-priced car, they probably will surpass us, and a point to which they will devote the utmost attention will be in body lines and exterior finish of their products. Points which they will work out probably will be: The use of genuine leather as against artificial leather in upholstery; greater variety of colors in body finishes, and special body designs.

Mechanically, we may expect some development in the efficiency of the motors from lessons learned in war aviation; a greater use of electric starting and lighting; probably short wheelbases without sacrifice of body space; possibly a general return to the semi-floating axle, and certainly the construction of every car, as heretofore, with right-side drive, and as probably, as far as possible, without advancing costs too greatly, the right-side gear-shift within the body.

The Future's Disclosures

How long it will take European manufacturers to get into production on after-the-war models is, of course, an open question, but we are safe in assuming that there may be some interesting disclosures all along the line when these new cars appear.

The question of financing after the war is a problem that must come in for the most serious consideration. Remembering that much of the buying from Europe was done on a time basis, while the American manufacturer has always demanded cash in the United States, it can be seen that the European car, everything else being equal, would have the preference in countries where much of the business is done on a draft acceptance basis. Latin-America has generally been considered as the field demanding such accommodations, but the same conditions prevail to a great extent in the Far East. Let us say, for instance, that a dealer abroad has or can secure enough money to purchase ten cars outright. He sends the money to America, his cars are shipped and delivered within from 3 to 6 months. Until these cars are sold, money is not available for further purchases. Would it not be preferable to accept the same amount of money—enough to guarantee shipping expenses both to and from the foreign field—as a deposit on twenty-five or thirty cars, balance to be paid 30, 60, or 90 days, always assuming, of course, that the house with which the manufacturer is doing business is dependable and sound financially? It is a business risk that many New York export houses have taken successfully in the interests of the development of their trade and to the advantage of the American car maker.

As To Trucks

The question of trucks is not as open and evident as that of the passenger car. There are many conditions to be considered, bearing in mind that it took American business men many years to be convinced of the advantage of motor service over horse hauling; and in many countries where human labor is extremely cheap the truck salesmen will have to be even more convincing in his presentation of hauling costs. But trucks are now used to a certain extent in practically every land, and the development of trade will undoubtedly be largely governed by the success attained by these pioneering vehicles.

Tractors a Problem

The tractor is even more difficult to diagnose than the truck. Its development, except in the extremely large, high-priced equipment, has been so limited that any opinion as to its use cannot be ventured without a close study of conditions in each individual field.

The period remaining between now and the end of the war, and possibly for 1 or 2 years thereafter, must be utilized to the utmost by the American manufacturer of motor vehicles, not only in missionary work but also in the development of his product to meet export requirements.

Parts Makers at Paris Trade Fair

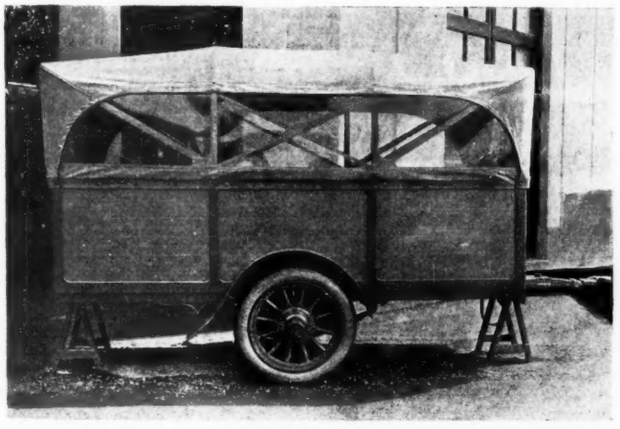
French Concerns Give Indications of Tendencies After War in Exhibits—An Ingenious One-Piece Frame Stamping—Eight-Passenger Trailer

WHILE there were no cars shown at the Paris Trade Fair this year, there was a fairly good representation of components and automobile accessories. The St. Chamond Steel Works, which had a very handsome stand, showed an original automobile frame which is a one-piece stamping with its cross members and engine subframe. Thus there is no riveting. The same company had on show a two-wheel eight-passenger automobile trailer, with canvas top and big mica windows. This is a development of war practice, most of the European armies now making use of light trailers behind various types of trucks. For instance, it is common practice, where men have to be taken daily, or several times a day, from their depots to the place of their work, to hitch two-wheel trailers behind ordinary trucks, and thus double the carrying capacity, without interfering with the usefulness of the original material. The St. Chamond idea appears to be an attempt to apply the same practice to civilian service. The trailer could be hitched behind an ordinary touring car, or a fast pneumatic-tired truck, and would find its greatest usefulness on a country estate or depot work liable to great fluctuations. The axle is a solid construction, the wheels being artillery type with 135-mm. pneumatic tires. The rest of the vehicle is as light as possible, the interior fittings consisting of basket-work arm chairs. Entrance is at the rear.

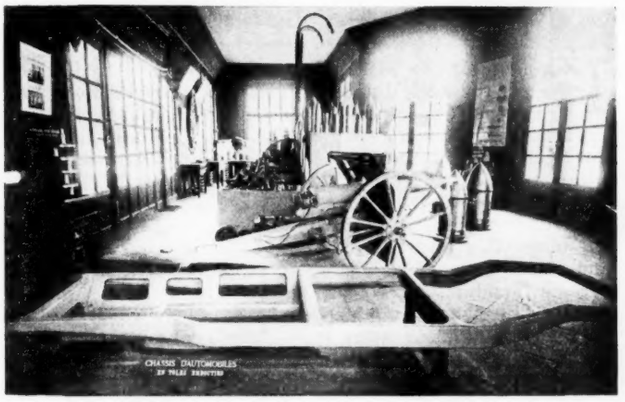
After-War Tendencies Indicated

The Paris Fair is interesting by reason of the indications it gives of after-war development. Makers of axles, gearboxes, steering gears, etc., are showing activity, although the exhibitors do not by any means cover the entire field. The magneto construction field also is incomplete, but interesting. There are two important firms producing magnetos since the war. They are Grouvelle & Arquembourg and Salmson Aviation Motor Co. The former markets the Jarnac carbureter, and has long been connected with the motor industry by reason of its radiators and fans, although these represented but a fraction of its total activities. The Salmson company has been in the aviation motor business for a number of years, and is one of the several firms having recently secured a contract for over $20,000,000 worth of aviation engines. It now makes all its own magnetos, ranging from the starting type to the twelve-cylinder model, and is preparing to offer them to the general public.

The technical feature of these magnetos is the use of a hollow cast aluminum frame on which is mounted the permanent magnetos and which also carries the armature and distributer mechanism. Construction is lightened, the appearance is improved, and all working parts are dust and waterproof.



A two-wheeled, eight-passenger trailer exhibited at the Paris Trade Fair



Automobile frame forming a one-piece stamping with cross members and engine subframe. This ingenious exhibit was shown by the St. Chamond Steel Works at the recent trade fair held in Paris

France Develops Magneto Industry

In addition to these two new firms, the Compagnie Generale des Magnetos showed a complete line. This latter firm is also new to the magneto industry. One of the most important companies, which also has taken up magneto construction since the war, is the S. E. V., which does not exhibit. This firm made electric lighting sets before the war, and in 1914 took over the Bosch establishment in Paris and ran it until its own magneto factory, which is now ten times bigger than the original Bosch works, had got into working condition. About 75 per cent of the French automobile manufacturers are financially interested in this concern. Other magneto firms are the Lavalette-Eisemann Co., the Gibaud, the Nilmelior, and about half a dozen smaller concerns. These developments are quite sufficient to show that France will remain independent of Germany for magneto supplies. Her plan is, however, to remain independent of all outside nations, a condition which has not yet been attained, for American magnetos are being imported, and are being used even on airplane motors. The more common plan is to use American magnetos for truck service and European magnetos for airplane service. So far as the future is concerned, it has to be admitted that the outlook for selling American magnetos in France is not very brilliant. There is no reason why the firms now producing for the army only should not eventually be in a position to meet the nation's peace requirements.

With the exception of some new model Jarnacs, carbureters were not shown. The two leading firms, Zenith and Claudel, appear to be too busy with national requirements to seek outside business. Claudel, incidentally, has just formed his business into a joint stock company with a capital of $800,000.

Ford Tractors in Quantity
Read the *Exclusive*
Article on Pages 182-184

Steels Used in Airplane Work—III*

Typical Steels of Various Properties—Change Points Important—Carbon Steels Afford Comparison for Alloy Steels—Air-Hardening Steels to Be Used on Larger Scale

By Dr. W. H. Hatfield

IN a paper of this kind it is totally impossible to deal adequately with the different steels that are now being used in this field, and the best that can be done is to take and discuss a few typical ones. For instance, for case-hardening purposes three or four different steels may be used, sometimes a plain low carbon material, at other times, say, a nickel or a nickel-chrome steel. When we come to consider high-tension steels many people swear by nickel-chrome steel, but under this term "nickel-chrome" quite a large range of analysis is included; again, some people successfully employ chrome-vanadium steels. To consider air-hardening steels, the term "air-hardening" applies to a range of steels, and the only thing to do is to take a typical one as an example. Looking at matters broadly from this standpoint, a series of steels have been selected which, on detailed discussion, will give an accurate idea of the large range of composition, coupled with the physical and mechanical properties, which are now available for purposes such as the one under discussion. In the appended table will be found a list of the steels with which it is proposed to deal, together with their approximate composition.

It will be noted that silicon, sulphur and phosphorus are not included in the table. With regard to silicon, it is now generally admitted that a fair percentage of this element is an advantage, owing to its utility in deoxidizing and in assisting to produce sound material. When we come to consider sulphur and phosphorus, it is well to emphasize that these elements should be as low as circumstances permit. While discussing these steels from a general standpoint, attention is drawn to the fact that if the price of a special steel is paid it is necessary to submit it to its special treatment if value for the money expended is to be obtained. For instance, cases have come before the author where expensive steels have been bought and merely forged and dealt with as if they were ordinary carbon steel. In the first place they should not be treated as ordinary steels in the works, because they will require working with special care and can easily be damaged—indeed, put into a worse condition than ordinary steel; and in the second place, unless they are put through the special treatment which their constitution needs, the resulting mechanical properties fall very far short from what they should be.

TABLE I

Steel.	Carbon.	Manganese.	Nickel.	Chromium.	Vanadium.	Tungsten.
1. Case-hardening steel						
—Carbon	0.12	0.7	..	..	..	..
—Nickel	0.10	0.2	5.0	..	..	..
2. Carbon steel.....	0.5	0.6	..	..	..	..
3. High-tensile steel—						
Nickel-chrome	0.35	0.4	3.0	0.6	..	..
Chrome-vanadium..	0.35	0.4	..	0.6-1.0	0.16-0.25	..
4. Air-hardening steel..	0.3	0.4	4.0	1.5	..	..
5. Stainless steel.....	0.3	0.4	..	13.0	..	..
6. High-nickel steel...	0.25	0.3	25.0	..	..	..
7. Magnet steel.....	0.6	0.3	..	..	..	5.5
8. Manganese steel.....	1.2	12.5	..	..	..	..

Thermal Phenomena of Steels

Before discussing the particular properties of individual steels it will perhaps be as well to explain the changes taking place at the critical change-points which occur in steel by means of a series of heating and cooling curves, since the thermal phenomena are of such fundamental importance.

If a sample of pure iron be carefully studied it will be found that upon heating the specimen up to a temperature of 1000 deg. C. two distinct arrests of the otherwise regular rise in temperature will have been noticed. The explanation is that fundamental changes have taken place in the material at those arrests, accompanied by an absorption of heat, *i.e.*, energy required to accomplish the changes referred to. Curve A, Fig. 2, indicates diagrammatically the nature and position of these changes. The first arrest at 770 deg. C. marks the appearance of the non-magnetic condition; the second at 930 deg. C. marks an allotropic change in the material, accompanied by change in several properties. On cooling down the arrests are replaced by corresponding evolutions of heat representing converse changes. Pure iron is of little immediate interest in aero work, and may therefore be dismissed after these preliminary comments.

Carbon Steels

If, now, a little carbon be added to iron and, say, a case-hardening steel is produced, the heating and cooling curves become modified. Curve B, Fig. 2, illustrates the result. This steel contains pearlite, existing at ordinary temperatures, a mixture of iron-carbide plates and iron. When a temperature just over 700 deg. C. is reached this constituent changes into a homogeneous substance, *i.e.*, a solid solution of carbide of iron with an absorption of heat resulting in an additional arrest on the heating curve non-existent in the case of pure iron. It will be noticed that the magnetic change still occurs at the same temperature, while the allotropic change, Ac3, occurs at a distinctly lower temperature. It may also be pointed out that as the temperature rises after passing the carbon change-point the areas of solid solution increase owing to the solution of more and more ferrite in the original solid solution areas, and finally, in passing the allotropic change, the whole material becomes a homogeneous dilute solid solution of carbide in iron. On cooling, the reverse changes take place at the temperature indicated in the curve B, Fig. 2. On reaching ordinary temperature, provided adequate time for cooling has been allowed, the material is as before the experiment. To take now a 0.6 carbon steel, the major portion of the material consists of the constituent pearlite, and thus it might be expected that the carbon change-point becomes still very much more evident and that the other critical points associated with a pure iron are very considerably lowered as regards the temperatures at which they occur. A heating and cooling curve for such a steel is given in curve C, Fig. 2. It will be seen that the upper critical points have, for practical purposes, been lowered to and joined up with the carbon change-point. It will be noticed that the absorption of heat, synchronizing with the formation of the solid solution on heating, takes place at about 730 deg. C., while on cooling the evolution of heat associated with the breaking down of the solid solution takes place 20 to 30 deg. lower.

Iron-Carbide Diagram

It was thought useful to include the iron-carbide equilibrium diagram, and this is given in Fig 1. Its practical application will now be quite apparent. It will be seen to deal with iron containing carbon from nothing to 5 per cent, *i.e.*, it covers the range from iron-carbon steels to pig iron, and diagrammatically presents a mass of useful facts. If the *arrests* during cooling of an infinite number of pure iron-carbon alloys covering the range of the diagram from 1600 deg. C., *i.e.*, well in the liquid state, are plotted, the lines presented will be obtained. This is rather an over-statement.

*Paper presented to the Aeronautical Society of Great Britain, slightly condensed.

since the lines *AD* and *ID* have had to be confirmed by other methods. It is, however, no part of the present paper to discuss the theoretical details of this diagram. There are, however, three main lines to which attention should be drawn: (1) The line *AB*, indicating that by increasing the carbon content the freezing point is dropped from 1506 deg. C. for pure iron to 1137 deg. C. for the eutectic, *i.e.*, pure pig iron. This is the explanation of the low melting point of the cast irons. (2) The line *EGI*, indicating that the solid solution (single constituent) persists to progressively lower temperatures until the material contains 0.9 per cent of carbon. The case-hardening and carbon steels recently dealt with may be considered from this standpoint. (3) The line *IJ*, extending completely across the diagram, which indicates that in the pure iron-carbon series the solid solution breaks down into pearlite at practically the same temperature.

Curves A, B and C, Fig. 2, will be found to fit in with the equilibrium diagram, always remembering that the latter is built upon the *cooling* curves. It is perhaps wise here to place a caution with regard to the position of the lines shown on the diagram. The position of these lines will be found to be affected by the manner in which the cooling curves are made. In the first place, absolutely correct calibration of the pyrometer must be obtained, and in the second place it must be understood that (1) size of mass, (2) speed of heating and cooling, (3) degree of maximum temperature attained during the heating, all actually influence the temperature at which the physico-chemical changes take place. In illustration of this point we cannot do better than instance the results contained in a paper given by Dr. Stead, F.R.S., at the Brussels meeting of the Iron and Steel Institute in 1913. Dr. Stead prepared a number of test pieces containing practically nothing but iron and 0.90 per cent of carbon. This, as will be seen from the diagram, should have only one arrest on heating and one evolution of heat on cooling; therefore it was an extremely suitable steel for comparative determinations. One each of these bars was sent to contemporary metallurgists and institutions and results obtained for comparison. It may be stated that the figure given for the absorption of heat on heating covered the range from 719 to 746 deg. C., while on cooling the change was variously stated from 697 to 719 deg. C. It should be noted that the remarks made in the last paragraph apply even more to alloy steels, such as used in aero work, than to ordinary carbon steels. After commending the equilibrium diagram to the careful attention and study of all interested in the heat treatment of steels, it is proposed to leave it for the present.

Nickel-Chrome Steels

If other elements—such, for instance, as manganese, silicon, chromium, nickel, tungsten, vanadium, etc.—are added to steel, the position and character of the arrests on heating and the evolutions on cooling such steels are apt to be modified. To take the steels D and E (Fig 2)—the nickel-chrome high-tension and air-hardening ones: The change to the solid solution state with absorption of heat takes place at approximately the same temperature on heating, but on cooling the breaking down takes place at a much lower temperature. Here is the explanation of the value of added nickel and chromium to a steel. It makes the carbon change more sluggish, *i.e.*, more easily controlled and suppressed, and here lies the explanation of the reason why such alloy steels may be hardened in larger masses, and here also is one of the explanations as to why such excellent physical properties can be obtained by heat treatments. The added element usually brings about its influence by modifying the chemico-physical properties of the iron and carbide. With the nickel and chromium content of air-hardening steels the speed of cooling produced by air-cooling is quite quick enough to suppress the carbon change and present the "solid solution" state, whereas water-quenching is only effective more or less with carbon steels, according to the mass employed.

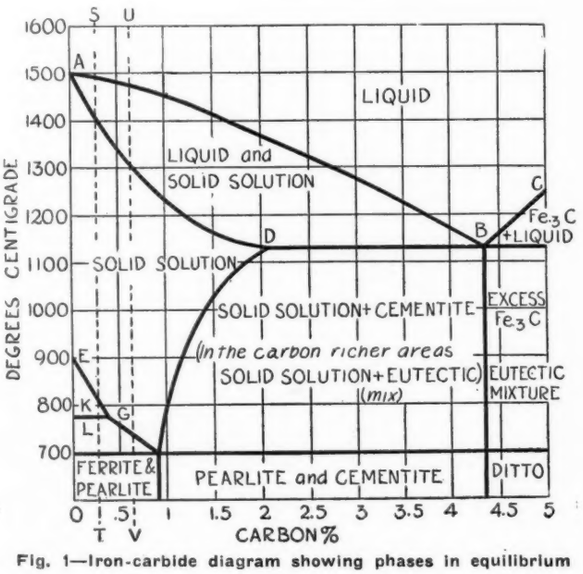


Fig. 1—Iron-carbide diagram showing phases in equilibrium

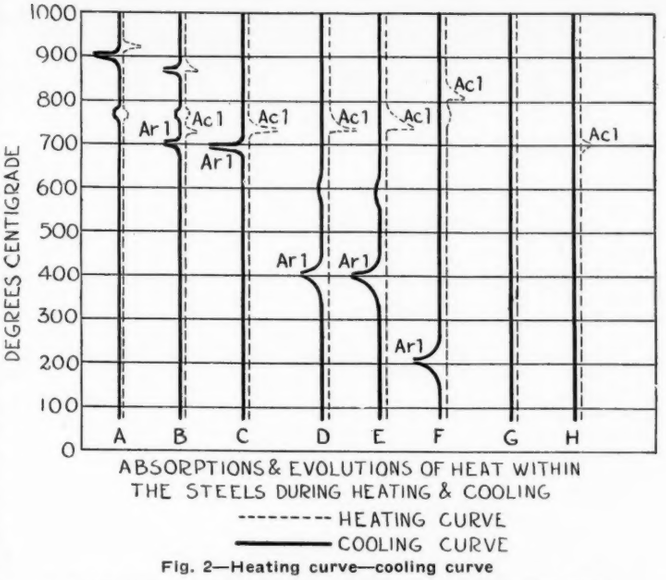


Fig. 2—Heating curve—cooling curve

A, pure iron; B, case hardening carbon steel; C, carbon steel; D, nickel chromium high tensile steel; E, air hardening nickel chromium steel; F, stainless steel; G, 25 per cent nickel steel; H, manganese steel

High-Chrome Steel (Stainless)

In curve F, Fig. 2, will be found the heating and cooling curve of the high-chromium steel. Here the change to the solid solution state does not take place until about 800 deg. C., and consequently if it is desired to harden such steel it must be heated to considerably higher temperatures than ordinary carbon steels. Again, upon cooling (and here it may be pointed out that this is an air-hardening steel), the change from the solid solution state takes place at varying temperatures, according to the maximum temperature to which it has been heated; the speed of cooling also affects the position of the recalescence point. If slow enough, the change takes place soon after 700 deg. C. has been passed.

Twenty-five Per Cent Nickel Steel

See curve G, Fig. 2. This steel is unique in that the critical points do not occur in those ranges of temperature met with in works practice, provided the composition under discussion is secured. The result is that no arrests or absorption are observed during heating and cooling, and we have, therefore, only to deal with the solid solution state, modified in properties by the presence of 25 per cent of nickel. It will be seen at once that it is this fact which explains the non-magnetic properties of this material.

High-Manganese Steel

See curve H, Fig. 2. Here we have a steel which has no arrest upon cooling, *i.e.*, we obtain again the "solid solution,"

this time containing 12 to 14 per cent of manganese, which, if well preserved, *i.e.*, cooled with sufficient rapidity, is also non-magnetic. Recent researches by Sir R. A. Hadfield have, however, shown that such a steel after tempering (which in this case hardens the steel) does develop a definite arrest in the usual position of the carbon change-point; hence the dotted indication. If the steel be heated up without tempering, ordinary observations would not detect an absorption of heat at the critical point.

Typical Steels Discussed

In the adjoining table will be found a list of the typical steels, with the mechanical properties to be expected from them:

TABLE II

Approximate Mechanical Properties of Typical Steels Used in Aero Work.

Steel and Treatment	Y.P.	M.S.	E.%	R.A.%	Imp. (Izod.)	Remarks
1. Case-hardening steel—						
Carbon as supplied	20.0	30.0	30.0	65.0	..	..
Case-hardened core	24.0	35.0	25.0	60.0	..	..
Nickel as supplied	28.0	36.0	35.0	65.0	..	..
Case-hardened core	35.0	50.0	25.0	55.0	..	..
2. Carbon steel—						
Forged or rolled	25.0	42.0	22.0	40.0	..	..
Normalized	23.0	40.0	27.0	50.6	..	..
3. High-tensile—						
Hardened and tempered	55.0	65.0	20.0	55.0	35	..
4. Air-hardening Ni.-Cr.—						
Air-hardened	90.0	100.0	10.0	35.0	20	..
Oil-hardened and tempered	50.0	55.0	22.0	55.0	50	..
5. Stainless—						
Oil-hardened and tempered	40.0	50.0	20.0	55.0	55	Rustless
6. 25% nickel—						
Toughened (quenched)	15.0	40.0	45.0	50.0	..	Non-magnetic
7. Manganese sheet steel—						
Toughened	19.0	35.0	Bend double		..	Non-magnetic
8. Sheet steel—						
High-tensile (annealed)	20.0	30.0	Bend double		..	..
Oil-hardened and tempered	35.0	48.0	Bend double		..	..
Low-tensile (heat-treated)	20.0	30.0	Bend double		..	..
9. Cast iron—						
Pearlitic	..	16.0	....		..	..
Ferritic	..	12.0	....		..	..

Taking different types of steel now in detail:

Carbon Steels

Carbon steels are of general interest because they constitute the major portion of steel produced, and also incidentally because they afford a means of comparing the alloy steels. Plain carbon steel—and by that term we mean a steel to which nickel, chromium, vanadium, tungsten, etc., have not been intentionally added—is used, to take a particular case, for the production of aero cylinders. Such steel is generally fairly high in carbon, and will give approximately a tensile strength of 40-50 tons with an elongation of 17-20 per cent. It has from time to time been questioned whether cylinder forgings require normalizing, and in the opinion of the author it is strongly advisable to put them through this treatment to *dissipate* any stresses left from the forging or punching operation. If the finishing temperature be a suitable one, this precaution may not be necessary, but it is perhaps best as a safeguard. As illustrating generally the properties of carbon steel, the series of tests given before the Iron and Steel Institute some few years ago are given. In the following tables will be found the tensile test figures obtained from steels (made in this instance by the Acid Bessemer process) varying from 0.1 to 0.86 per cent of carbon, while the manganese varies somewhat between 0.5 and 1 per cent. The figures (tensile test bars 0.564 in. x 2 in., heat treatment on 1-in. bars) are given for the forged and normalized condition, since such steels are not submitted to the same treatment as alloy steels.

TABLE III

As Received (Rolled).

Mark	Analysis: Carbon, Per Cent	Analysis: Manganese, Per Cent	Yield Point, Tons Per Sq. In.	Maximum Stress, Tons Per Sq. In.	Elongation, Per Cent on 2 In.	Reduction of Area, Per Cent	Y. P. × 100 / M. S.
A	0.10	0.56	19.1	25.9	37.1	63.4	73.7
B	0.27	0.68	26.7	35.8	32.7	58.9	74.6
C	0.29	0.92	26.6	40.9	25.0	46.8	65.0
D	0.32	0.67	27.1	39.9	26.6	47.8	68.0
E	0.44	0.90	30.7	46.6	25.7	48.2	65.9
F	0.50	0.92	30.6	52.2	19.8	42.3	58.6
G	0.70	0.90	34.7	59.0	17.9	34.6	58.8
H	0.75	0.92	36.6	64.2	15.3	30.6	57.0
I	0.86	1.03	40.6	52.6	1.8	3.3	77.2
Normalized.							
A	0.10	0.56	18.5	24.8	37.4	59.8	74.6
B	0.27	0.68	25.0	34.3	30.5	51.2	73.0
C	0.29	0.92	25.7	40.8	26.3	53.5	63.0
D	0.32	0.67	25.5	39.3	24.0	44.4	65.0
E	0.44	0.90	28.4	48.1	21.0	41.8	59.0
F	0.50	0.92	30.6	52.3	18.8	38.2	58.5
G	0.70	0.90	35.7	59.4	15.9	29.0	60.1
H	0.75	0.92	35.9	65.4	10.8	17.1	54.9
I	0.86	1.03	39.0	54.5	1.8	2.9	71.6

It might be useful here to discuss the changes which take place in carbon steels on heating and cooling, and as illustrating the general changes it is proposed, although carbon steels have already been partly discussed from other standpoints, to take two particular steels, viz., a 0.25 per cent carbon as representing an ordinary structural steel and a 0.60 per cent carbon as representing the steels used for purposes with which you are familiar. To study a steel of 0.25 per cent composition, we can advantageously draw a line on the iron-carbide equilibrium diagram (Fig. 1) in the position ST. Starting from the liquid condition of the steel, it will be found that freezing commences at a temperature of a little under 1500 deg. C., followed by complete solidification at the line AD. The mass then exists as a solid solution down to practically 800 deg. C., at which temperature pure iron crystals begin to separate, and continue to do so until the line LI is reached. Above 800 deg. C. we have the mass consisting entirely of solid solution of carbide of iron in iron. Below that temperature the iron crystals gradually increase in size and number with falling temperature, the solid solution areas becoming richer in carbon owing to their loss of iron, until at the line LI the mass consists of less than a third of solid solution containing 0.89 per cent of carbon distributed through a matrix of ferrite. On passing through the critical point marked by the line LI, these remaining solid solution areas break down and become areas of pearlite. The line KG is usually placed in the diagram, and represents an evolution of heat which is known to synchronize with the appearance of the magnetic properties of iron; it will thus be appreciated that when the steel passes through the temperature of 770-760 deg. C., the ferrite, already precipitated, becomes magnetic. It is also to be noted that this only applies to the precipitated iron, as the iron of the solid solution retains its non-magnetic condition down to the recalescence point line LI, which marks the change to pearlite in these areas.

To take a 0.60 per cent carbon steel and study it by means of a line UV drawn across the diagram, we find considerable modification in the temperatures at which the critical changes take place. The initial freezing temperature begins a little lower, and is followed by complete solidification on reaching the line AD. The whole mass, consisting then of solid solution, cools down as a homogeneous substance to just over 730 deg. C., at which temperature some little iron separates from the solution. Within 20-30 deg. however, the mass of the steel, still consisting of solid solution, breaks down into pearlite, and the result is that we have a steel now consisting of pearlite, in which small areas of ferrite occur, as against, in the 0.25 per cent carbon steel, one consisting of ferrite in which relatively small areas of pearlite occur.

High-Tensile Steels

When we speak of high-tensile steels we mean alloy steels containing suitable quantities of nickel, chromium, vanadium, etc., which by simple heat treatment may, in suitably large masses if necessary, be put into such conditions that they will give 50 to 70 tons tensile strength, accompanied by a good elongation.

To produce the final condition of a high-tensile steel, the steel must be first hardened with a view to producing a homogeneous solid solution phase and then must be tempered to such a temperature as will leave the steel just in that con-

dition in which it will give the tests required. The special elements present, such as nickel and chromium, enable the hardening operation to be effectively and easily performed, while they also, in a similar way, influence and render more complete the control of changes taking place upon heating for tempering. Examples are given in this paper of the effects obtained from typical steels by tempering.

Air-Hardening Steels

Air-hardening steels seem to be extremely important, and the author predicts that when they are more completely understood will be used to a much greater extent than at present. The difference between an ordinary high-tension steel and an air-hardening steel consists in the fact that an air-hardening steel heated to temperatures of 800-850 deg., and allowed to cool in air, will have great hardness, whereas the hardness so introduced by the same treatment in an ordinary carbon, or even high-tension steel, is in no way comparable. The air-hardening steels largely used at present are somewhat similar in analysis to the figures given in the Table I, and it will be seen that it is the presence of the high nickel, along with the high chromium, which induces the specific property. When we say that by simply cooling in air this steel becomes hard we mean that the rapidity with which the article will cool in air is quite sufficient to cause an almost complete suppression of the thermal change which is responsible for the breaking down of the solid solution into the pearlitic condition. Such air-hardened steel will, on air-hardening from temperatures from 800-850 deg. C., give 100 tons per square inch maximum stress and upward, accompanied by elongation in the neighborhood of 10 per cent. Such figures would seem to the author to be extremely valuable to the engineer designing aero parts, and as time goes along much greater use will be made of this steel. This steel responds to tempering in analogous manner to the high-tension steels, and as indications as to the kind of results which may be expected in the two states, figures are given in Table III.

Stainless Steel

This high-chrome steel has been selected as one of the typical steels because it represents an entirely new departure. The stainless and non-rusting properties of this steel were discovered in the Brown-Firth Research Laboratory during the time of the author's predecessor, Harry Brearley, and since that time its uses for various purposes have developed until the material now occupies an important position among special alloy steels. Table I gives an indication of the composition of this steel, and it will be seen to be a low carbon steel containing 11-15 per cent of chromium. The steel is an air-hardening one, and consequently requires working with care, but as experience accumulates in the handling of it, practical difficulties, even in the handling of considerable masses, will no doubt be eliminated. In the subdivision on hardening and tempering a full set of figures relating to this steel in its various determined conditions will be found. This steel has the decidedly unique property of successfully resisting the ordinary corrosive action of the weather, change from wet to dry atmospheric conditions, organic acids, oxidizing influences, and sea water. As an instance, a polished surface of this steel may be placed in the open during any period of the year and left for two or three months, after which it will still be perfectly bright and unrusted. It would appear that for seaplane work this steel should have quite a large application. It is at present used for aero valves in the place of high-speed steel, and certainly would appear to form a possible material for making streamline wires, etc. Owing to the excellent mechanical properties which can be obtained from this steel by hardening and tempering—which mechanical properties are accompanied by the rust-resisting properties—it would seem that for structural parts its use will become more general as time goes on.

Manganese Steel

Manganese is added ordinarily to steel to make it forge well, *i.e.*, to eliminate oxygen, and to more than neutralize any sulphur which may be present. It incidentally strengthens the steel even when present in quantities much under 1 per cent. The steel we are considering, however, under the above heading is the special high-percentage manganese steel containing 11-15 per cent of that element alloyed with the steel for the special purpose of obtaining those peculiar properties of the alloy discovered by Sir R. A. Hadfield something like thirty years ago. The influence of added elements upon the carbon change-point has already been discussed, and it is useful here to record that as the manganese content added to steel is increased, the carbon change-point on cooling is depressed so thoroughly that in the case of this special steel it does not occur even by the time that ordinary temperatures are reached, the result being that ordinary cooling really has the effect of producing the hard, unresolved condition of the material. If this steel be quenched from temperatures approximating to 950 deg., the well-known tough, non-magnetic condition of the material is obtained.

(To be continued)

Motorscope Permits Inspection of Combustion

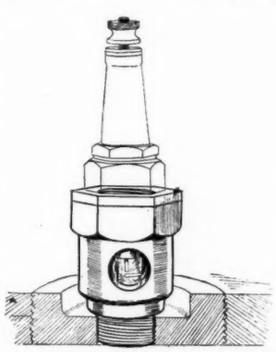
Color of Flame Indicates Quality of Mixture—Allows Best Carbureter Adjustment

THE Motorscope is a device which permits the operator to look into the combustion chamber and determine the performance of the engine by the quality of the flame. It is a metal bushing containing three glass windows, screwed into the spark plug opening and carrying the spark plug. One is placed in each cylinder in turn or a set may be used during the time that the engine is being tested and adjusted. Performance, primarily, depends upon one thing—the complete and proper combustion of the gas on each explosion stroke. The Motorscope offers a visible index of this combustion, and shows the operator at a glance whether the mixture is too rich, too lean, correct, or whether the plugs are inoperative, or the compression poor. A test made on a Dodge Brothers car by a representative of THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES showed that:

1—A correct mixture was evidenced by a regular, blue flame.

2—A rich mixture was shown by a yellow flame.

3—A weak mixture made a weak flame.



The Motorscope is used only while the cylinder is being tested. Observation of the flame quickly shows whether the mixture is correct

4—Skipping, or dead cylinders by an intermittent, or no flame.

5—Poor compression, dirty plugs, weak spark were evidenced by a weak flame in that cylinder.

6—Excess oil was evidenced by small particles of yellow flame.

It is to be understood that the Motorscope is only a test device, and is kept on the engine only during the time that the trouble is being located and the necessary adjustments made. When a perfect burning mixture is obtained, the flame has the same blue color as a gas burner flame; the yellow color in the rich mixture is due to the presence of unburned incandescent carbon particles. Fineness of adjustment, not even possible on a dynamometer, is obtainable with the Motorscope, due to the fact that the horsepower output is not greatly affected by a slightly rich mixture, though the slightly rich mixture is readily shown by the device.

The price of a single Motorscope for any car is $2; in sets, $1.75 each. It is made by the Detroit Accessories Corp., 419 Hillger Avenue, Detroit, Mich.

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SERVICE is one of the most discussed and mooted phases of modern business methods, but is recognized as essential to constructive business building.

When the salesman has made his successive steps in a sale and secured the order the sale has only begun.

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Too many salesmen think they have done everything for the house and for the customer when the order is obtained. The real work is only started then. Unless the salesman realizes the value of service and its relation to future orders and new customers he may make the service feature a difficult matter. If he overstates the amount and kind of service that will be given he has established a false standard in the customer's mind that may lead to the destruction of confidence which is the foundation on which business is built.

First—Prompt Delivery

Prompt delivery of right goods is the factor of service first influencing the mind of the new buyer. If goods are delayed in shipping he may be very greatly inconvenienced and even suffer loss. If the wrong goods have been sent the effect is even worse than when delay is made in shipment.

There must be a sales viewpoint in all the factory departments so that the greatest co-operation is always being exercised for the customer's good. Then if the merchandise is of such a nature that installation is necessary it should be done promptly and well by a thoroughly competent man.

I know of an instance where a customer suffered loss because of a fumble in installation service. A new man came with some pumping machinery to assemble and put it in operation. He made an error which necessitated sending the spoiled part back to the factory and a new one being sent, all of which took time and needless expense while the buyer was losing money and prestige by the delay.

When Times Are Hard

Easy terms in times of distress will usually do much to hold the trade against future in-roads of competition. In the lives of most men there are times when it is difficult or even impossible to pay bills promptly. They may be and usually are good moral risks but are temporarily hard up. If the selling concern can give extension of credit at times of this kind it will invariably result in permanent good will and appreciation expressed in terms of continued patronage.

Service costs money and many—yes, those who give it—object to the cost. Have you ever thought that the buyer has a thoroughly good reason for expecting and demanding good service? That reason is because he pays for it! The customer pays the costs and the profits. It is out of the customer's pocket that stock dividends are paid and if you do not want him to groan with agony when this extraction is made give him the amount and kind of service that makes him a satisfied customer.

Hit the Even Road

Avoid extremes of too little or too much service. Too little creates dissatisfaction and results in eventual loss. Too much makes needless cost and interferes with progress.

By carefully analyzing the product and the uses to which it is put in the hands of the trade a sane, safe and profitable standard of after-service can and should be established which will produce repeat business and not cause displeasure or distrust in the mind of the buyer.

The motive that prompts this service should be one of co-operation. It must be unselfish and genuine or it won't be effective. The greater part of the gain by service always comes back to the one who gives it willingly and unselfishly.

Make Your Goods Serviceable

The first purpose of after-service, and it should not be prompted by selfish motives either, is to make the article serviceable to the buyer. Unless it is serviceable, dissatisfaction will usually result and *that rusts the wheels of business.* Cutomers must get value received for the money they pay for merchandise or else they won't spend more money for other commodities of the same kind but will go elsewhere for their requirements. To illustrate:

When I was sales manager of the Addressograph Co., of Chicago, we had a large territory that was not producing the volume of orders that it should and numerous complaints came in that indicated an improper relation between the agent and his trade. I visited the city and inside the first half hour discovered the sticking point.

The Dealer Didn't Understand

The agent, while a thoroughly conscientious man and a capable business fellow, did not understand the value of after-service and was therefore not in close touch with the users of our machines. Together we made a canvass of the city and put every machine in good condition and at the same time renewed our friendly relations with the users.

One of the customers had a large mailing list to which he sent quotations of grains once each week. The machine had been in constant use but had gradually become harder to operate and turned out increasingly poor work. The addresses were finally so poor and the machine operated so hard that it had been abandoned and the work resumed on the typewriters which took much longer and cost more money for each mailing.

A Little Oil—That's All

All the machine needed was a thorough oiling to make it operate like new and a new platen and a slight adjustment to make the addresses clear, sharp and uniform in impression. They had forgotten or else never thought *that it was a machine and needed a little attention* from time to time as any other piece of mechanism. In ten minutes the machine was again in good service and the owner happy. To-day he owns several and is a thoroughly satisfied customer.

The agent saw his weak point in selling. He employed a service man to regularly inspect the machines in his territory and to-day his orders are ever increasing because his users are boosters.

AFTER - SERVICE

Selling your product is one thing. Keeping it sold is another. Products that stay sold bring repeat orders, no matter whether they are cars, spark plugs, tires or safety pins.

The factor that plays an important part in the goods of the automotive industry is after-service. Selling goods and letting the buyers worry along by themselves thereafter is one extreme. The other extreme consists of giving so much service that the profit disappears.

After-service is not always from the dealer to the customer. It may be from the factory to the dealer, or from the factory direct to the consumer. The factory which builds solidly upon the principle of after-service generally has better dealers and more repeat orders than the factory that is concerned only with getting goods out of the shipping room.

"After-service" was covered at the recent World's Salesmanship Congress in Detroit by H. A. Worman, vice-president and general sales manager of the Fowler-Worman-Kelley Co., Cleveland, whose experiences and conclusions are summarized in the story that appears on this page.

Another motive that should prompt the rendering of unselfish service is that of increasing the profits of the customer by aiding him to resell the goods bought so that he may as soon as possible order more. Such service will profit both the buyer and the seller and is the ideal combination in business.

Assist the Dealer

The National Carbon Co. of Cleveland, is noted for this particular kind of service. They do everything within the bounds of reason to assist the dealer to dispose of his merchandise and the result is always a boomerang in the form of orders, for an increased quantity of stock.

As an illustration of this service let me tell of one instance: Along the New England coast are a great many watering places, particularly off the coast of Maine among the many beautiful islands. There are thousands of launches and motor boats used there and this has developed a big trade in dry cells for ignition purposes.

The small dealers who located among these islands to supply the trade are stocked from the warehouses of Boston jobbers. Theoretically it is not up to the National people to visit this small trade but should be the work of the Boston jobber.

Calls on the Users

Nevertheless, a special salesman who understands the installation, use and sale of ignition batteries makes a prolonged and detailed trip of service among these small dealers, fishermen, and pleasure-seeking campers or residents to help any and all he can.

He shows the boatman how to use the cells, teaches the dealer how to sell them and in short does everything in his power to move the goods from the dealers' shelf to the boats. The inevitable result is orders from the jobber for more merchandise for the shelves that have been emptied by co-operative service. *This policy extended and put into practice all over the world is the fundamental cause of the phenomenal growth of this large and prosperous corporation.*

What a Paint Man Did

In a little different fashion a paint salesman has developed a tremendous business that seems impregnable to competitors. He has done it by having the customer's needs and condition always in mind even though it may at times result in temporary loss to his firm.

On his first trip into a new territory which had been held by another salesman of the gold brick promoting type he found the dealer stocked to the ceiling with quantities, brands and sizes of containers which would last for endless time. In short he had padded his sales sheet to make a good showing without realizing, or if so without caring, that he was killing trade rather than creating it.

The new salesman literally took off his coat in each store he visited and assorted the stock according to the sizes, brands and quantities he thought the customer needed and shipped the balance of the stock back to the factory. In some cases he added some brands or sizes or quantities to balance the stock. On the whole his first trip brought more paint back to the factory than the factory shipped out to his trade. He had worked for the best interests of the dealer and thereby worked best for his own and his firm's interests. *When you serve the customer you profit.*

Where Little Things Are Big

The success or failures of after-service is frequently determined by little things. They are too frequently overlooked in the desire to do the greater and more important operations of efficient service. Most men take much for granted and overlook the larger points done in their behalf but never overlook the little features that someone has skipped or knowingly neglected.

A lady had bought some goods for window curtains. She needed a half yard more to complete the set and without it the curtains would be useless; she visited several department stores, including the one where she had made the original purchase, but could not find anything she wanted. The store that made the sale did not offer her any assistance.

She visited another large department store known for its courtesy to customers and told her troubles. The salesman told her that they did not have what she needed but that they would have it at her house on the following day.

Super-Service

This is what they did—telegraphed to New York for the half yard, had it sent by special delivery from New York, and when it arrived at the store sent it by special messenger to the lady's house. The price billed her was only thirteen cents, the store's retail price of the half yard.

That store knows the value of little things in service. The size of the store, its standing in the community, and the amount of dividends are conclusive evidence that customers know about and appreciate this close attention to small matters of service.

In the printing field we find good examples of the value of these little features that do much to create satisfaction or destroy it. If when printed booklets or catalogs are delivered they are bound with string and not wrapped, as is very frequently done, several books in each bundle are spoiled by the string cutting into them. In the stock room others are soiled by dust. The total loss in an institution that buys any great quanity of printed matter amounts to dollars each year. The print shop having the spirit of service wraps the bundles of books so that there should be no loss from soiled or torn stock. It costs the printer slightly more, takes a little more time but holds customers, and since the customer pays in the end why should he not be considered.

In the Automobile Field

Possibly one of the greatest sources of controversy that can arise concerning this question of service is found in the automobile field. Firms have gone bankrupt because they did too little service and others because they did too much without proper supervision or compensation. On the whole automobile owners largely judge the desirability of a car by the service given it after it is put in use.

No better illustration can be found of the importance of caring for the little things than in this field of business. A man may buy a car at any sort of price but price alone does not determine the usefulness of the car. That is determined by service. And if the principal features of that service are properly performed and some minor ones neglected the customer is displeased and dissatisfied.

How the Owner Judges

He may not even know of the time and care that was put into an inspection but judges results solely by external, superficial conditions. What does a man care how many hours a service force has worked on his machine looking after all the really important parts if he finds he has a ruined suit of clothes because of cup grease on the cushions and steering wheel?

What does he care how someone has sweated over difficult adjustments or replacements if he finds his fenders or hood scratched by placing tools or lamp cords on them unprotected? What does a man care about the labor done on his car if he is late in getting it after promises have been made him by the service manager and he thereby misses an important engagement which may be serious?

The Hudson-Stuyvesant Motor Co., of Cleveland, has been making an exhaustive study of the psychology of service and its effects on sales. They have developed an expensive organization and an elaborate institution for the sole purpose of catering to every whim of every customer in every kind of service feature. From the porter who opens the rear door of the main service building to the telephone operator in the front of the sales room everyone has been thoroughly drilled in the observance of the customers' viewpoint. I believe the motive is unselfish that prompts the service but they have found that it pays to think of the other fellow.

Cutting the Sales Cost

The results of service will be in proportion to the efforts honestly made. Satisfactory service means satisfied customers and satisfied customers bring *repeat orders at low sales costs and usually bring others with them when they do come back.*

Acetylene Welding in Automobile Engineering*

Plant Required for Oxy-Acetylene Welding in Automobile Factories—Features of the Process and Examples of Its Applications in Automobile Manufacture and Repair

By Herbert L. Towns

THE evolution of the methods employed by manufacturers in the industrial world is a source of wonder and probably one of the greatest advances is that of welding. Along with welding has come the cutting of metals by the application of heat, and so great has been the development of these means of manufacture that the welding and cutting apparatus has become an ideal and absolute necessity to the engineering trade.

In dealing with this subject it will be advisable to make some classification, and the best method to adopt will be to deal with the process of welding in a general sense, and then consider the possible applications to the automobile industry.

Welding is the process of joining two pieces of metal by melting the adjacent edges of the metal together, and the methods of producing the necessary heat have varied; among them are the oxy-hydrogen, the oxy-acetylene and the electric arc methods. The oxy-hydrogen flame is very rarely, if ever, used, as the heat produced by this flame is not nearly so intense as the heat produced by the oxy-acetylene flame or the electric arc, and as the oxy-acetylene flame is more extensively used, it will be as well to confine all consideration to this method in order to devote the limited time at our disposal to a single subject.

Classed as Autogenous Welding

Oxy-acetylene welding is classed as an autogenous welding process in which two parts of the same metal, or different metals, are joined by the melting of the adjacent edges of the two parts and causing them to become joined without the use of hammers or any form of compression, the melting of the edges of the pieces of metal being performed by the heat produced by an oxy-acetylene flame. It may be well to mention that the term "autogenous welding" is often used as being the method of welding performed by the heat of the flame produced by the combustion of a mixture of gases, but the correct meaning of "autogenous welding" is the joining of pieces of metal without the aid of any foreign material.

The oxy-acetylene flame is very small in size, and results from the combustion of a mixture of oxygen and acetylene, which mixture has been made in a special burning torch or blowpipe.

Acetylene is a gas, and may be quoted approximately as 92½ per cent of carbon and the balance hydrogen, this only being approximate on account of certain small percentages of impurities that may exist; for instance, a certain proportion of the hydrogen may be phosphuretted and sulphuretted.

The presence of hydrogen retards the combustion of carbon in oxygen, so in order to get a more rapid combustion, oxygen is mixed with acetylene, which mixture generates the hottest flame for welding, a heat of up to about 7000 deg. Fahr. being obtainable. This heat is greatly in excess of the heat produced by the oxy-hydrogen flame, the heat generated by the oxy-hydrogen flame being only about 4000 deg. Fahr.

Two important methods of supplying acetylene to a shop in which the welding of metals is performed are largely adopted, these being either to have portable welding outfits which include the generator, oxygen cylinder, flexible pipes, blowpipe, etc., or to have the generator fitted in a special shed or house built outside the shop. In the case of the portable outfit each operator has one of these appliances, which can be moved to any part of the shop as required. It will be seen that this method is most useful in shops where welding is not too frequently required to be done. In the case of the fixed generator the whole supply of acetylene for the use in the shop can be produced and led into the shop through pipes, the size of the generator being arranged to suit the size and requirements of the shop.

Acetylene Generators

There are various types and makes of generators now on the market, and it will be very interesting and I hope instructive to devote some attention to one or two of these types. A type of generator suitable for attaching to a portable welding plant is shown in Fig. 1. This generator is very compact, light in weight, and has the advantage of being adaptable to almost any portable framework, as it requires no fixing. Adjustable chains can be fitted to the side of the tank for the purpose of carrying the oxygen cylinder, in which case it is unnecessary for the generator to be fitted on a framework; it can stand on the floor and be moved from place to place as required. The following table shows the size of the generator in comparison with the output of acetylene.

TABLE I.

Height		Weight			Output of Acetylene per Hour	Charge of Carbide
ft.	in.	cwt.	qr.	lb.	ft.	lb.
4	9½	3	2	0	50	20
6	6	4	1	14	70	30
7	3	4	3	0	100	50
7	9	6	2	0	150	75

A generator of this description is automatically controlled, and therefore requires little or no attention save the charging of the carbide tray and the filling of the water tank. It will be seen from Fig. 1 that the carbide chambers are actually contained in the water tank, which makes the generator very compact. The plant is worked as follows: Carbide is placed in the carbide trays or generators (the sketch only shows one, but two are fitted side by side) and the tank is filled with water. The cock *W* which is fitted to the pipe *T* connecting the water tank with the generators is then opened, and water flows from the water tank to the generator; acetylene is then produced, and passed through the pipe *M* into the water, through which it bubbles into the gas bell; as the gas bell fills with acetylene it rises, being steadied by guide and pillars. One of the guides on the gas bell has an extension fitted, which engages with a twisted vertical bar *S*, this bar controlling the water cock *U*. Now, as the gas bell fills and rises the bar *S* is automatically operated to shut off the water cock *U*, this preventing further flow of water from

*Paper read before the Coventry branch of the Institution of Automobile Engineers—slightly condensed. Drawings from *Engineering*.

the tank into the generator. The acetylene is taken from the gas bell through the pipe *N* and is passed through the purifier *D* to the burner. It should be noted that the acetyline is first purified by being passed through the water, from the pipe *M* into the gas bell. As the acetylene is used, the gas bell falls, and the cock *U* is again opened to allow water to pass into the generator, and the process repeats itself.

TABLE II.

Height		Weight			Output of Acetylene per Hour	Charge of Carbide
ft.	in.	cwt.	qr.	lb.	ft.	lb.
6	8	13	2	0	100	36
6	8	16	3	0	140	50
6	8	19	0	0	160	60
9	3	22	2	0	175	75
9	3	27	0	0	250	100

A type of fixed generator is shown in Fig. 2, which type of plant does not differ in principle from that shown in Fig. 1. In this type of plant the generators and the purifying chambers are independent of the gasholder. It will be noticed that a special washing chamber *H* is provided through which the acetylene is passed from the generators to the gasholder.

The table in the preceding column shows a comparison of the size and output of these types of plant.

In each of these types of plant the generators can be recharged with carbide without in any way disturbing the supply of acetylene, as the gas cannot get back from the holder into the generators. These types of generating plants are manufactured as standard articles in various sizes by the Imperial Light Co.

Gas Is Sometimes Stored

A method of supplying acetylene to the welding torch, which is not commonly used in practice, is that of having the gas stored in tanks or cylinders, instead of generating it. The acetylene contained in these tanks or cylinders is dissolved in a liquid called acetone, this being the only known liquid that will dissolve acetylene to any appreciable extent. Acetone will dissolve twenty-four times its own bulk of acetylene at ordinary atmospheric pressure, and also possesses the strange feature of destroying the highly explosive nature of acetylene while they are mixed together. This feature has the extreme advantage of rendering cylinders of dissolved acetylene safe for handling and transporting, an advantage which is worth consideration. Acetylene is probably more useful in this form for purposes other than welding, for instance, the lighting of automobiles and ships, where generators would be a more dangerous fitment. Also there is the possibility of drawing the acetone out of the cylinder with the gas, if the rate of discharge of the gas becomes excessive, the result of this would be reduction in heat of the flame.

The oxygen which is used to support the rapid combustion of the acetylene is not as a rule manufactured by the consumer, and there is actually only one firm in this country at present which manufactures this gas in any appreciable quantities. The supply of oxygen is by no means adequate enough to meet the demand for industrial purposes, and some idea of the demand can be gathered from the fact that the British Oxygen Company alone, who are at present making additions to the oxygen-producing plant, hope when this is completed to have an output of approximately 375,000,000 cu. ft. per annum, or about 1,250,000 cu. ft. daily.

The pressure and consumption of oxygen is governed by the size of the blowpipe used to suit various thicknesses of metals, as will be seen from Table III.

TABLE III.

Thickness of Metals to be Welded	Approximate Oxygen Pressure Required	Approximate Consumption per Hour	
		Oxygen	Acetylene
in.	lb.	cub. ft.	cub. ft.
1/32 to 1/20	5	2	1 1/2
1/20 to 3/16	6 to 7	3 1/2	3
1/16 to 3/16	7 to 8	8	6
3/32 to 1/8	13 to 14	14	11
1/8 to 1/2	21 to 22	35	28
1/8 to 3/4	27	55	42
1/4 to 1	30	78	63
1 1/4 to 1 1/2	37	100	80
1 1/2 to 2	40	125	100

Oxygen cylinders are made in sizes varying to contain from 10 to 200 cu. ft. of the gas, the size most commonly used being the 100 cu. ft. If the welder knows the actual or water capacity of the cylinder, he can determine the approximate volume of gas remaining in a cylinder. This information is very useful, and in reality essential, in the case where a welder has a partly spent oxygen cylinder and a somewhat lengthy piece of welding to do, in order that it may be ascertained if sufficient oxygen is available to complete the work. As an example the following may be taken. Say a piece of welding work is required on metal of 5/8 in. to 3/4 in. thick, for a length of, say, 2 ft. This will necessitate the use of a blowpipe, which will consume 42 cu. ft. of acetylene per hour, and the work would require about half an hour in which to be completed, as will be seen from Tables III and IV. The consumption of oxygen for this work would be approximately 27½ cu. ft. Now if we assume that the welder has one 100 cu. ft. cylinder, which is indicating a pressure of

Fig. 1. PORTABLE ACETYLENE GENERATING PLANT

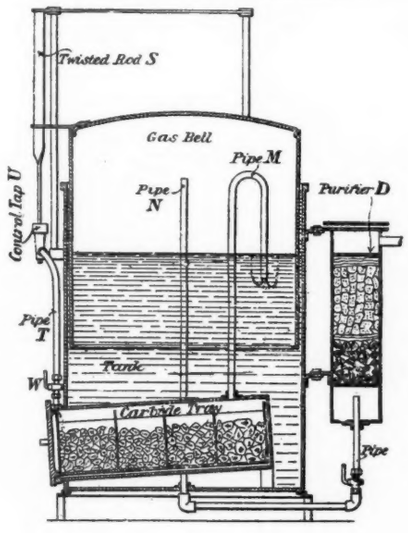
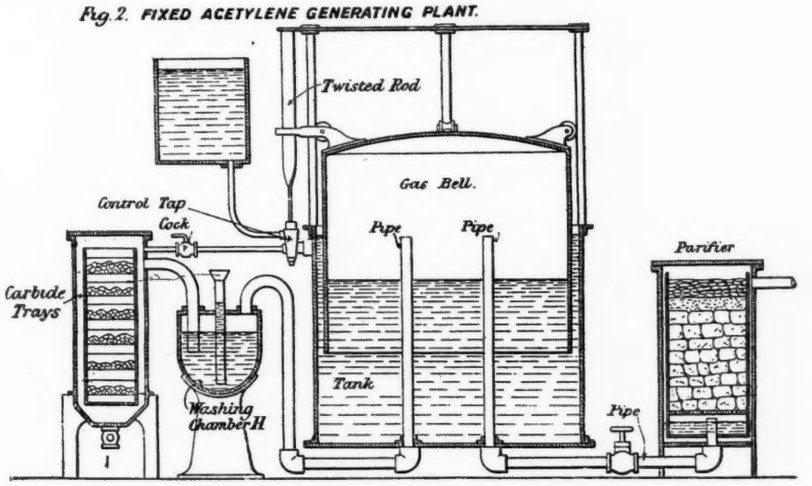


Fig. 2. FIXED ACETYLENE GENERATING PLANT.



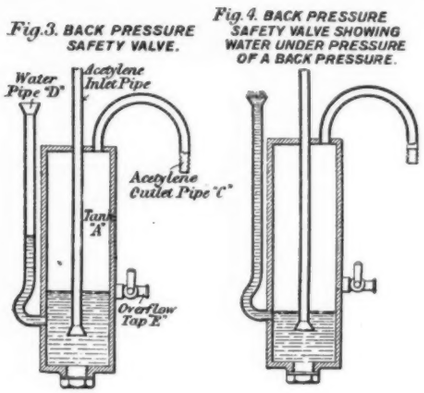


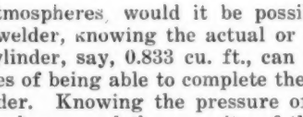
Fig. 3. BACK PRESSURE SAFETY VALVE.

Fig. 4. BACK PRESSURE SAFETY VALVE SHOWING WATER UNDER PRESSURE OF A BACK PRESSURE.

Fig. 5. FLAME PRODUCED BY A MIXTURE HAVING AN EXCESS OF ACETYLENE.

Fig. 6. NORMAL FLAME.

Fig. 7. FLAME PRODUCED BY A MIXTURE HAVING AN EXCESS OF OXYGEN.



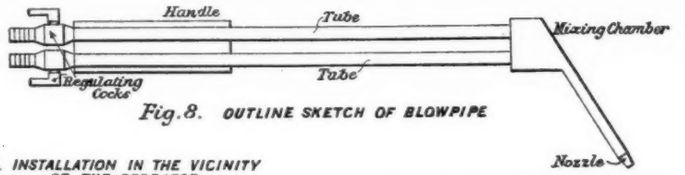


Fig. 8. OUTLINE SKETCH OF BLOWPIPE

Fig. 9. INSTALLATION IN THE VICINITY OF THE OPERATOR

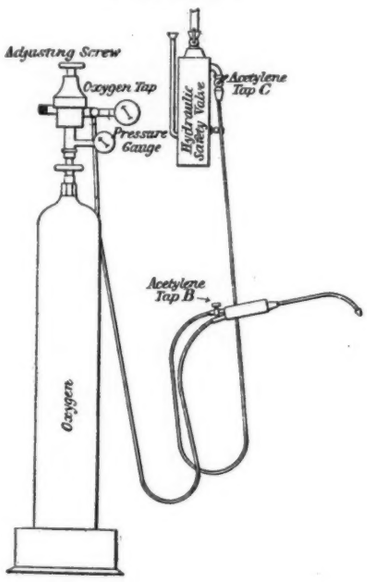


Fig. 10. FORM OF WELDS FOR METAL OF LESS THAN 1/16 INCH THICK.

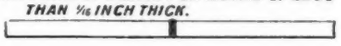


Fig. 11. FORM OF WELDS FOR METAL OF, FROM 1/16 TO 3/16 INCH THICK.

Fig. 12. FORM OF WELDS FOR METAL OF, FROM 3/16 TO 1/4 INCH THICK.

Fig. 13. FORM OF WELDS FOR METAL OF MORE THAN 1/4 INCH THICK.

36 atmospheres, would it be possible to execute the work? The welder, knowing the actual or water capacity of 100 cu. ft. cylinder, say, 0.833 cu. ft., can easily estimate the possibilities of being able to complete the work with the use of this cylinder. Knowing the pressure of gas in the cylinder (36 atmospheres, and the capacity of the cylinder (0.833 cu. ft.) the volume of gas at his disposal is equal to $36 \times 0.833 = 30$ cu. ft. (approximately). If we deduct, say, 2 cu. ft. or 3 cu. ft. which remain in the cylinder when the pressure has fallen to about 2 atmospheres, and allow for the possibility of a slightly larger consumption of oxygen by the blowpipe, we are left with approximately 26 cu. ft. or 27 cu. ft. of oxygen, and it would probably be possible to finish the work if it were done rapidly.

Carrying the Gases

Having considered the production of the necessary gases for oxy-acetylene welding, the next point for consideration is the carrying of the gases to the place for burning. Where a fixed generator is used it is necessary to have fixed pipes for the service of the acetylene to the place (or places where more than one blowpipe is being served) of welding, and the gas fed to the blowpipe by a flexible tube connection from the service pipe. Just as the use of copper is prohibited in the manufacture of acetylene generators, the use of copper tubes is prohibited for serving the gas to the blowpipe; therefore iron pipes should be used for this purpose, and these should preferably be galvanized, as the presence of any moisture in the gas would tend to form iron oxide, which may leave the pipe and accumulate in some more vital part of the installation. These fixed pipes should be fitted to the wall of the shop, and should be arranged with a slight upward run, so that any moisture forming in the pipe would tend to run back to the generator.

The size of the pipes fitted depends entirely on the number and size of the blowpipes to be used, and this should receive careful consideration in arranging for the fitting of an oxy-acetylene welding installation in any establishment. There is a danger of the pipes being too small in size, which results in the acetylene arriving at the blowpipe in insufficient quantities and probably at a considerably reduced pressure, hence the welder may have to increase the pressure of the oxygen he is using, with more or less disastrous results, as will be seen later in the consideration of the proportions of gas mixture. It should be remembered that the length of the piping should be taken into account, as well as the size of the blowpipes to be used, when fixing the diameter of the piping, in order that the loss of pressure of the acetylene may not be excessive.

Safety Valve Indispensable

There is an apparatus that is absolutely indispensable in the welding installation, this being the safety valve. As a matter of fact each blowpipe must have a safety valve which, in the case where a portable acetylene generator is used, is fitted to the generator, and where a fixed generator is used the valves are fitted to the fixed service pipes, in each case the acetylene passing through the valve, which is also connected to the blowpipe by flexible tubing. A type of safety valve is shown in Fig. 3, a description of which is as follows: The apparatus consists of a chamber or tank *A*, which is fitted with a filling pipe *D*, by which the tank is partly filled with water, the level of the water being regulated by the drain cock *E*. The pipe *B* is connected to the acetylene service pipe, and an outlet pipe C, to which the flexible tube is connected, is provided.

The object of fitting this safety valve is to prevent any oxygen from getting into the acetylene pipes, as would happen in the case of the blowpipe becoming temporarily choked up due to the splashing of molten metal or other causes, if a device of this description were not fitted, as the oxygen is always fed at a greater pressure than the acetylene; hence this safety valve prevents the formation in the pipes of a mixture of the two gases, which would be of an explosible nature, and consequently dangerous in case of the flame back-firing.

Details of Operation

The acetylene is passed from the service pipe into the water, through which it bubbles, and passes through the outlet pipe to the blowpipe. In case of a stoppage in the blowpipe the oxygen passes through the flexible tube into the tank *A*, and as the pressure in the tank is increased due to the oxygen not being able to gain an outlet, the water-level in the tank becomes lower, by the water passing into the filling pipe and the acetylene pipe, until the level of the opening into the filling pipe is reached, then the oxygen bubbles up through the water in the filling pipe and escapes into the air, as shown in Fig. 4. These valves require very little atten-

tion, save the checking of the water-level by the drain cock when the system is in use, this being preferable to getting the correct level under working pressure.

The feeding of the oxygen to the blowpipe is done through flexible tubing of three-ply rubber, which is preferable to metallic flexible tubing, owing to the increased danger arising from the deterioration of metallic tubing not being so noticeable as that of the rubber tubing.

The blowpipe is an instrument requiring careful consideration and thought from first to last, in the first place in the designing and lastly in the handling during operation—the consideration in design being partly to make the instrument absolutely safe in case of careless handling on the part of the welder, and consideration on the part of the welder partly to allow for bad design. The blowpipe, if properly designed, built up, and handled, is an instrument of simplicity and safety, being light, compact and easy to handle. The work to be performed by the blowpipe, namely, that of mixing the two gases, is of extreme importance, as the obtaining of a good sound weld to a great extent depends on the mixture of the gases.

Correct Mixture Is Essential

In theory, for the total combustion of one volume of acetylene 2½ volumes of oxygen are required, but in actual practice the proportion of acetylene to oxygen varies between 1 to 1¼ and 1 to 1¾. The result of a weld obtained by the use of a mixture of gases in incorrect proportions, may be of a very unsatisfactory nature, as if a superabundance of oxygen be admitted the flame produced will have oxidizing effects, whereas if a superabundance of acetylene be introduced the flame produced will have a carbonizing effect, in which case a hardening of the metal in the immediate vicinity of the weld will result, and the finished work will, consequently, be of a brittle nature.

The correct flame for welding is therefore half-way between an oxidizing and a carbonizing one. An experienced welder can readily estimate the proportions of the mixture of gases he is using by a glance at the flame produced. Some idea of the flames produced by different mixtures is given in Figs. 5, 6 and 7. Fig. 5 shows the flame produced by a mixture having an excess of acetylene, and all blowpipes should be able to produce such a flame by having the oxygen admitted at normal pressure and the acetylene at full pressure, although this flame should not be used. If a blowpipe is not capable of producing a flame of this description, either it is faulty, or the system for carrying the acetylene from the generator is in some way out of order, causing the passage of the acetylene to be obstructed. When a blowpipe is producing this type of flame, the acetylene cock on it, or the outlet cock on the safety valve, should be partly closed, till a flame similar to that shown in Fig. 6 is produced, which is the correct flame to use. The center white light which appears in Fig. 5, as a somewhat indefinite form has now become smaller and more definite. If a further reduction in the supply of acetylene be made by closing either of the cocks in the acetylene system already mentioned the center white light becomes much smaller, as shown in Fig. 7, which is an oxidizing flame, produced by a mixture of gases having an excess of oxygen.

Various Forms of Blowpipes

There are many different forms of blowpipes in use, but the general principle is the same in each case, and they vary in length from about 1 ft. to 2 ft. The blowpipe as shown by the outline sketch, Fig. 8, consists of a handle through which pass two tubes, each of which is fitted with a regulating cock.

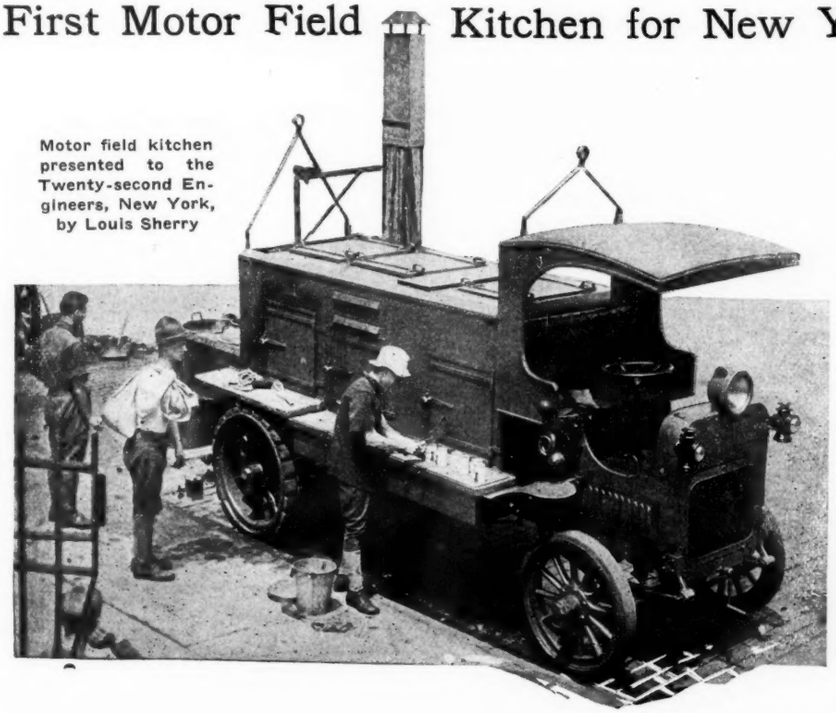
The tubes carry the gases to a mixing chamber, from which the mixture is passed to the nozzle. In the designing of a blowpipe an essential point for consideration is the distribution of weight, as the instrument should as nearly as possible balance when held by the operator, for ease of manipulation.

Blowpipes are divided into three distinct classes, which are named according to the pressure at which the acetylene is being used, namely: (1) low pressure, (2) medium pressure, (3) high pressure. The pressures at which the acetylene is used are approximately: (1) for low pressure, 0.1 to 0.25 lb. per square inch, which is the pressure at which the acetylene is generated; (2) for medium pressure, 1.5 lb. to 5.5 per square inch; (3) for high pressure, 4.5 lb. to 7 lb. per square inch.

High-pressure blowpipes are not commonly used in practice, in consequence of which blowpipes are often referred to as being of two classes, high pressure and low pressure, the high-pressure class being what in reality is the medium-pressure class. The real high-pressure blowpipe is only adaptable in cases where dissolved or compressed acetylene is being used, all other forms of acetylene having insufficient pressure for the mixing of the gases.

(*To be continued*)

First Motor Field Kitchen for New York 22nd Engineers



Motor field kitchen presented to the Twenty-second Engineers, New York, by Louis Sherry

A FIELD kitchen mounted on a motor truck chassis, the first of its kind in the service, has been presented to the Twenty-Second Engineers, New York, by Louis Sherry, the well-known restauranteur.

The kitchen contains a complete outfit for preparing all kinds of food. Among the features are a range which can use either wood or coal. This range is equipped with four caldrons with a capacity of 20 gal. each, and a bake oven. At the other end of the kitchen from the range is an icebox; and in one corner is a butcher's equipment including saws, cleavers, grinders, and meat choppers.

Feeds Two Companies

In addition to the main requisites there is a large variety of spoons, ladles, knives, frying-pans, sauce-pans, colanders, and strainers. At present the field kitchen is caring for two companies of engineers numbering 164 men. It is estimated that the kitchen could serve 450 men at a pinch.

1918 Packard in Two Chassis Lengths

Single-Wire Electric System, Hot Spot in Intake, Center Gearshift, Redesigned Frame and Gearbox Speedometer Drive Among New Features

SOME very important changes of an engineering nature have been made on the chassis of the Series Three Packard line. The entire electrical system has been re-designed and is now a single-wire system with a grounded return instead of the two-wire system. The chassis is now made in two different wheelbase lengths instead of four, as last season. The engine has now a hot spot in the intake manifold to assist in vaporizing the inlet gases, and there is also a difference in the arrangement of the inlet passages to permit a better distribution of the gases. The vibration damper has been re-designed, so that it is now possible to use a smaller fan drive pulley.

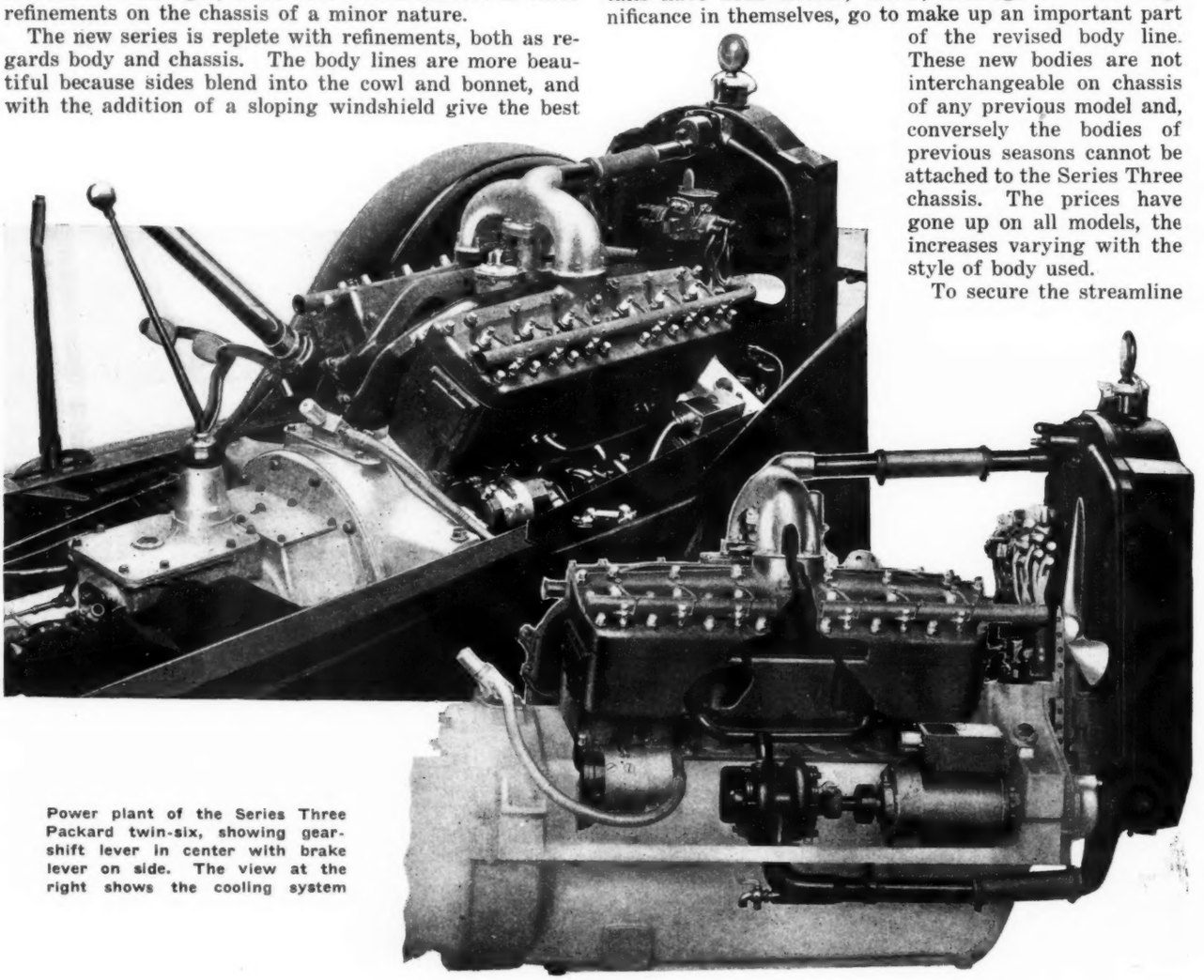
The speedometer drive has been removed from the front wheel and placed at the rear of the gearbox, and is driven by a special speedometer gear. In addition to these chassis changes, there have been a number of other refinements on the chassis of a minor nature.

The new series is replete with refinements, both as regards body and chassis. The body lines are more beautiful because sides blend into the cowl and bonnet, and with the addition of a sloping windshield give the best appearing Packard which has as yet been placed on the market. While this model is noticeably different from its predecessors, it is still distinctively a Packard car with all the familiar Packard identification marks.

Some of the features which make this new model strike the eye immediately as being different from previous Packards are the elimination of the familiar steering column control, which has been moved to the instrument board, and the adoption of the center gearshift in place of the gate on the left side. Other changes which alter the exterior are the mounting of the side lamps on the windshield instead of the cowl, and the adoption of invisible door hinges with the exception of the lower hinge on the rear door; there is a single tire carrier on the rear.

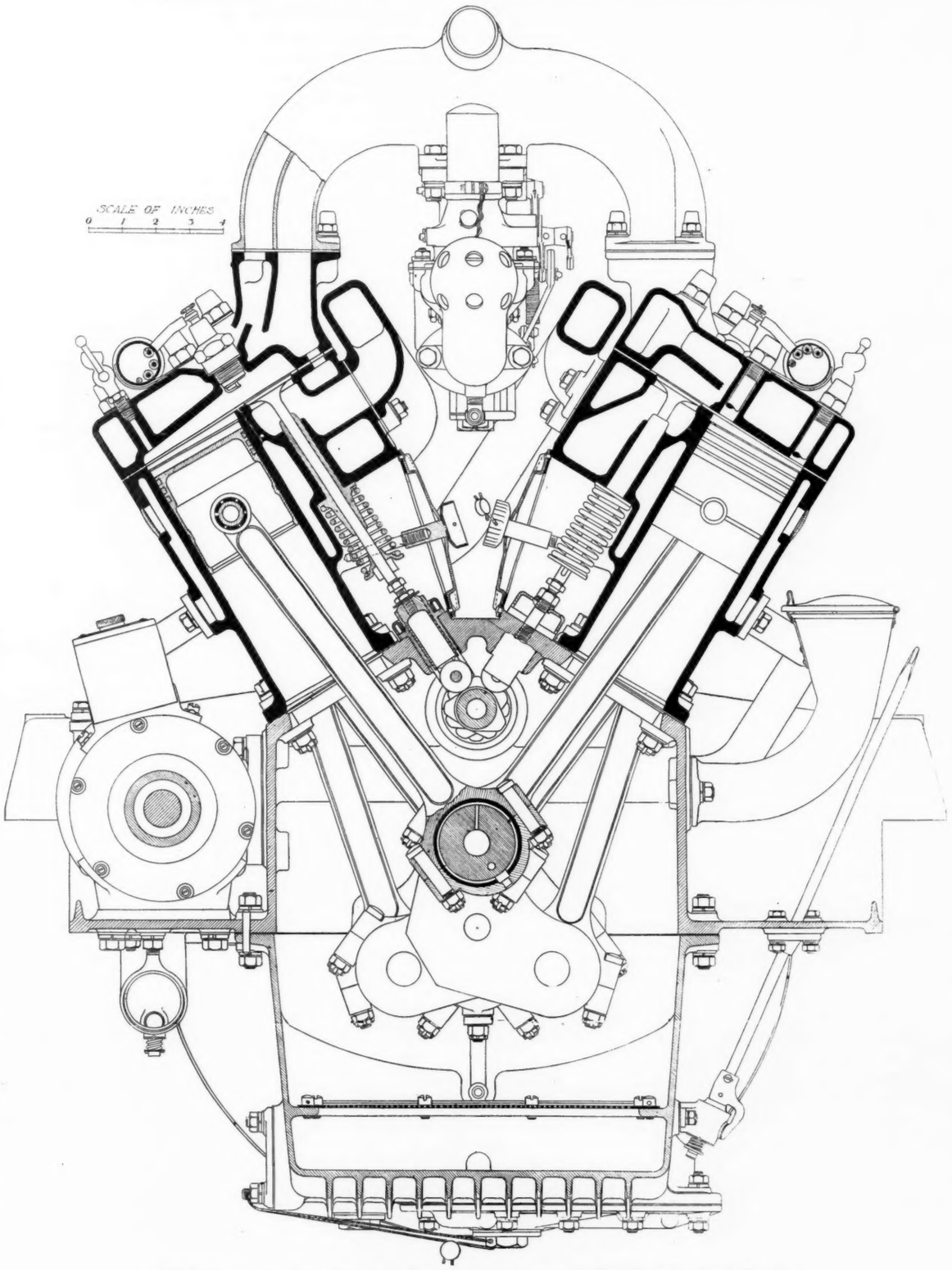
The body changes are important and a great many details have been altered, which, although of minor significance in themselves, go to make up an important part of the revised body line. These new bodies are not interchangeable on chassis of any previous model and, conversely the bodies of previous seasons cannot be attached to the Series Three chassis. The prices have gone up on all models, the increases varying with the style of body used.

To secure the streamline



Power plant of the Series Three Packard twin-six, showing gearshift lever in center with brake lever on side. The view at the right shows the cooling system

1918 PACKARD TWIN SIX ENGINE



Cylinders in the Series Three engine are 3 by 5 in., cast in two L-head blocks. This illustration gives a good idea of the valve action

design the front seat has been narrowed to some extent, although leaving plenty of room in the front compartment for two passengers with space to spare. Another change in the seating is that the auxiliary seats in all models are of the forward folding disappearing type.

Four bodies have been dropped from the line. These are the 35 phæton, two-passenger runabout, cab side limousine and landaulet. The coupé has been changed to the four-passenger type and the same seating arrangement as the four-passenger roadster has been used. The four and five-passenger broughams have been replaced by six and seven-passenger cars of the same type. The six-passenger limousine and landaulet are no longer available, but there is a 3-25 brougham with a six-passenger body, this being a square-cornered design.

To harmonize with the new body designs, the windshield has been entirely re-designed and slopes backward. On the open car it has swinging upper and lower sashes, and it is possible to swing the lower sash backward, so as to ventilate the lower compartment. The upper sash may be thrown forward for rain vision purposes. Both the upper sash and stanchion may be folded forward when the top is in the lowered position. Rubber weatherstrips are set into the windshield sash molding around the sides and bottom, a flap from the top of the upper sash upper molding serving to prevent wind and rain from blowing in over the top of the windshield. On inclosed bodies the windshield has stationary stanchions; these are drop-forged with drawn steel tubing sash moldings.

Semi-Crossed Fenders

The fender design has been completely altered, and is of a semi-crowned type made of a one-piece steel stamping. Fenders are more rigid and do not rely upon the fender brackets to prevent vibration. Except in the case of the runabout and coupé, fender brackets are not used with the rear fenders.

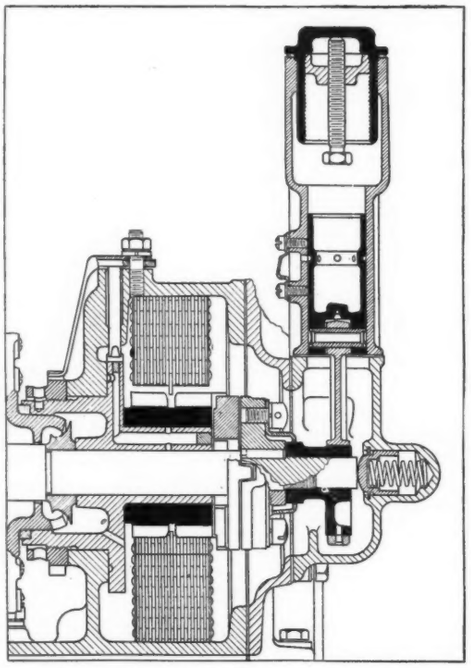
The open-body panels are now sheet-steel stampings instead of aluminum. The heel panels, seat frames and floor pans in the bodies have also been changed to steel construction. The body dash, cowl and cowlboard are one unit made of steel stampings welded together. The inclosed body panels are steel below the belted band, while the roof panel is of one-piece aluminum from the vizor front end to the belt in the rear of the body. This construction is designed to eliminate roof leaks in the panel joints.

Minor improvements have been made on the top. The head lining is a new pattern and the method of attaching the top to the windshield has been improved by making the clamps themselves adjustable. The gypsy curtain is made integral with the back curtain, and the latter is attached to the body with a nickel-plated molding instead of curtain fasteners as used on previous models of Packard cars.

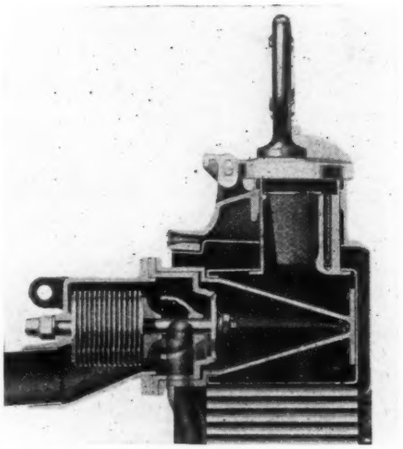
The top holders or bow supports are improved in design, allowing a better-fitting envelope and preventing the tearing of the head lining when the top is lowered.

All door stops or holder straps are of a new design, entirely concealed when the doors are closed. The electric telephone used in communication between the rear compartment and the driver in the inclosed body has been changed and the dictagraph style of instrument is used instead. The transmitter is concealed beneath the trimming in the rear quarter of the body. The Marshall type of cushion springs is continued in all cushions in both the open and closed cars, and the wooden finishing moldings on the top rail of the open bodies have been replaced by an aluminum section, which is applied in such a manner as to conceal the nails used in attaching. All the open bodies are equipped with a dark gray horse-hair carpet in the rear compartment, and all the closed bodies are of the round-cornered type with the exception of the six-passenger brougham, which is square-cornered.

The Packard Twin-Six unit power plant is practically identical with that used in the Series Two. The 3 by 5-in. cylinders are cast in two blocks. Cylinders are L-head and have detachable heads with one-piece gaskets. This construction is favored because of the facility afforded in cleaning the cylinders and permitting machining of the combustion chambers all over. This construction eliminates valve chamber plugs. The intake connection from the single carbureter to the header goes into the block at the top and forms the water outlet to the radiator. This gives a waterjacketed intake, helping in the carburetion of low-grade gasoline. The slight difference in the arrangement of the inlet passages between this model and the previous one has been noted. The carbureter is suspended in a 60-deg. cylinder angle, and the left block is set 1¼ in. forward of the right block, so that the connecting-rods may be mounted side by side.



Section through fuel pressure air pump



Details of thermostat mounting in Packard cooling system

Crankcase Is Ribbed

The crankcase is the same as in the previous model, being of aluminum alloy with four-point supports. The crankcase lower half is ribbed longitudinally for the dual purpose of stiffening the case and assisting in the cooling of the oil.

The crankshaft is 2¼ in. in diameter carried on three main bearings. The rod bearings are 2¼ in. in diameter and 1⅜ in. long, placed side by side on the crankpins, and the crankshaft bearings are 2¼ in. in diameter with the front length 2 7/16 in., center 3 in., rear 3⅛ in. The crankshaft bearing cap is cast aluminum and ribbed for strength. The connecting-rods are the same as the previous model, drop-forged, I-beam section, machined all over to get the lightest possible weight. All the rods

are interchangeable. The pistons are cast iron with three rings at the top.

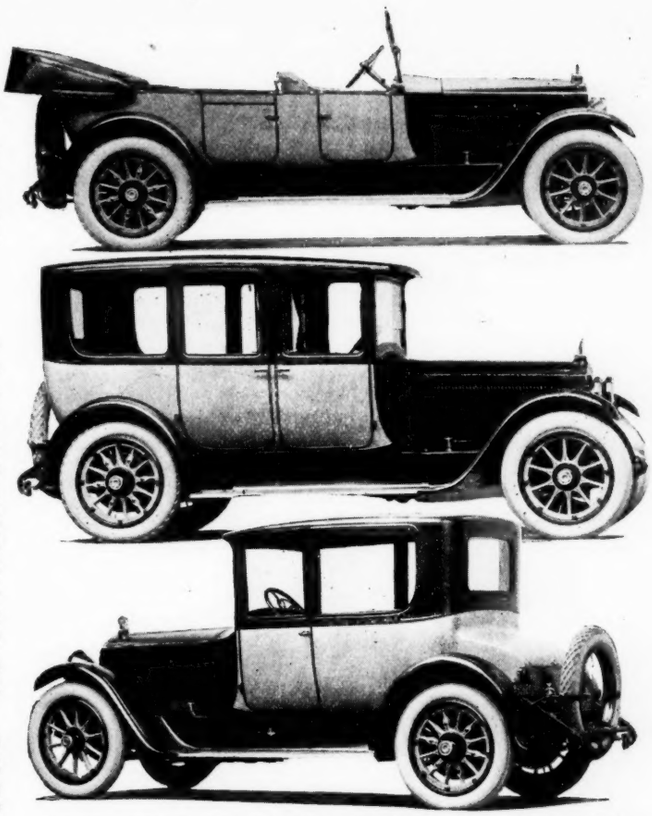
The valve system is operated together with the generator by an adjustable triangular drive silent chain 1½ in wide. The camshaft is hollow and located directly over the crankshaft, being supported on three bearings and carrying the twenty-four integral constant acceleration cams. The cams give the valves a lift of 11/32 in., and the valve diameter is 1½ in. in the clear. They are operated through tappets which are accessible by removing cover plates.

Wiring Is Simplified

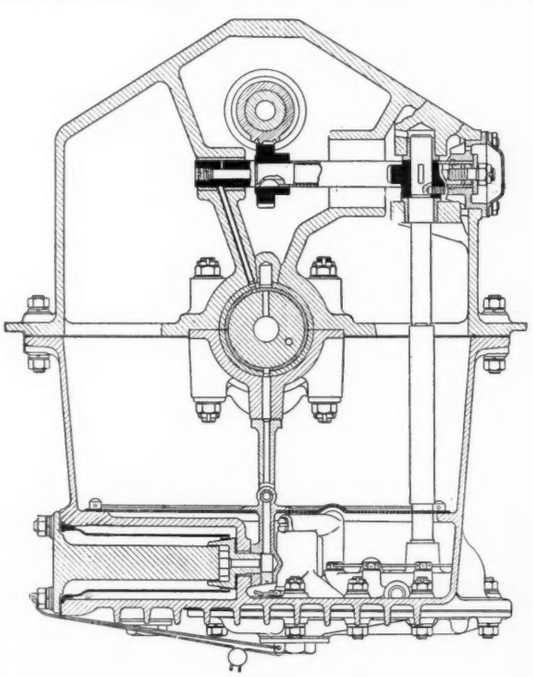
Electrically, the present model is the same as the previous one, with the exception of the alterations due to the adoption of the single-wire system in place of the two-wire. This has resulted in simplifying the wiring on the dash, and to reduce the number of binding posts. The wiring has been inclosed in the housing behind the dash and is out of sight entirely. When the body is removed it is only necessary to disconnect the binding posts at the front of the dash. The fuses can be reached through an opening in the dash at the front on the left side, and the cover over this opening is readily detachable. The system used for ignition, lighting and starting is the Packard-Delco with a Bijur starting motor. For normal running the spark position is controlled by a centrifugal governor with a hand advance as supplementary.

The Packard dry-plate clutch with six driving plates is retained, but it has been simplified so that adjustment is easy by means of a thumb screw, which is placed so that it can be reached from above. An improved type of throw-out bearing has been installed, which carries no load except when the clutch is disengaged. There is a new clutch brake designed to eliminate drag.

The gearset remains practically the same—three-speed selective with the housing bolted to the clutch housing. The reverse gear is a constant mesh type and constant mesh gears are in the front of the unit carrying the front bearings in the clutch housing rear wall. There is a difference in construction, due to the addition of center control, which has resulted in simplifying the shifter forks and shifter fork shaft. Where the lever is supported above the floorboard, the H-slot has been removed, giving a dirt-proof housing. The change lever is long and flexible, and carries a ball at the upper end where it can be reached without stooping forward. The gear ratios provided are 14.89 to 1 on first, 7.24 to 1 on second, and 4.36 to 1 on direct.



Upper—Packard seven-passenger touring car for 1918 mounted on the 3-35 chassis. It sells for $3,850. Middle—Seven-passenger Imperial limousine on 3-25 chassis; price, $5,200. Lower—Four-passenger coupe on 3-25 chassis listing at $4,800



Oiling system of the Packard Series Three twin-six engine, showing cooling ribs at bottom of crankase

The frame has been re-designed to give maximum strength, and this has been obtained by using the 7½-in. side member as formerly and by tapering the frame from the front and rear ends, so as to eliminate offsets. At each end of the frame are rigid forgings, fitted with cross tubes, which are splined, pressed and riveted into place. The stamped running-board brackets have been replaced by forgings.

Rear Axle Housing Is Steel

The rear axle is semi-floating and almost identical with the previous model, with the exception that the housing is made of steel with a malleable iron differential carrier to make stiffer construction. The torque arm has been re-designed to give greater strength and to facilitate manufacturing. This has been done by providing a stamping, so that the rear-end forging can be more readily riveted into place.

Springs are the same except that they are lower, and the wheels have been made interchangeable by a pressed-in stamping, which eliminates the right and left hand threading of the front-wheel hubs. Tire equipment is standard 35 by 5 all around.

Some of the attachments have been refined, such as in the steering. A ball thrust bearing is now used on

the upper end of the steering-gear case. The exhaust pipes are now combined in one, which leads under the motor on the left side of the car to the muffler. The radiator front splasher can now be detached by removing four screws from each side, and several details in the steering gear have been simplified and standardized, particularly the rake, which is now 42 deg. on all models. The gasoline pressure system has also been simplified as regards the tank and piping, and the latter has been increased to ⅜ in.

Special Detail Painting Optional

No extra charge is made for special painting when it is confined to body panels, door panels, wheels, bonnet, moldings and cowl. Door handles on all open and closed bodies are black rubber, except where extremely light colors are desired, when they will be furnished in nickel. For special colored leathers a charge of $25 is made. Gabriel Snubbers and Boyce Motor-Meter are standard equipment.

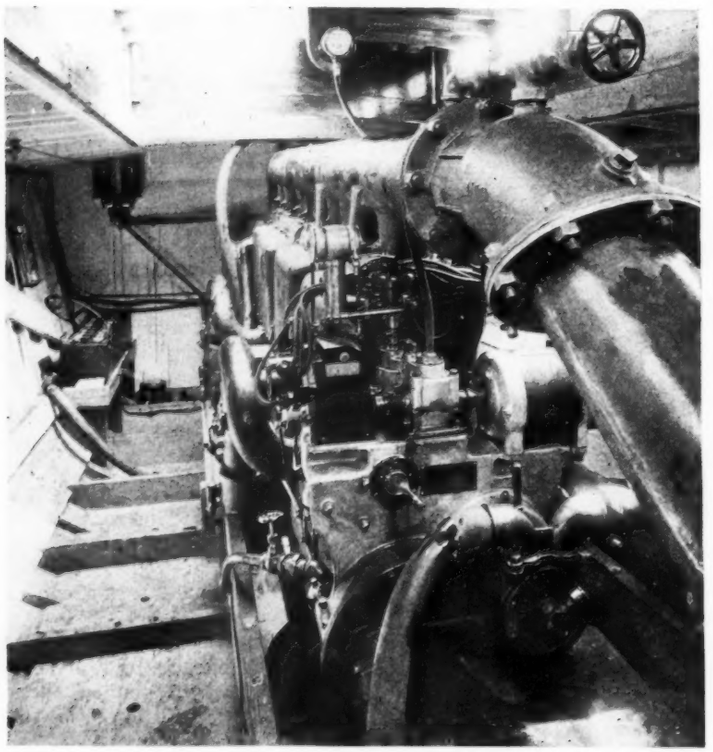
Prices of the different models follow:

Types	Price
3-25—	
Seven-passenger touring	$3,450
Seven-passenger salon touring	3,450
Four-passenger runabout	3,450
Five-passenger phaeton	3,450
Five-passenger salon phaeton	3,450
Seven-passenger limousine	5,000
Seven-passenger landaulet	5,050
Four-passenger coupé	4,800
Seven-passenger imperial limousine	5,200
Seven-passenger brougham	5,150
Six-passenger brougham	5,050
Chassis	3,050
3-35—	
Seven-passenger touring	3,850
Seven-passenger salon touring	3,850
Seven-passenger imperial limousine	5,600
Seven-passenger limousine	5,400
Seven-passenger landaulet	5,450
Seven-passenger brougham	5,550
Chassis	3,350

350 Hp. Dispatch Boat Dauntless Averages 35.02 M.P.H.

Eight-Cylinder Duesenberg Patrol Engine in 45-Ft. Craft To Be Offered To Government

Dispatch boat Dauntless averaging 35.02 m.p.h. in time trials following its launching at Essex, Conn.



Eight-cylinder, 350-hp. Duesenberg patrol engine mounted in the 45-ft. dispatch boat Dauntless. Similar installations will furnish power for two 65-footers now being built

DRIVEN by an eight-cylinder, 350-hp. Duesenberg patrol engine, the 45-ft dispatch boat Dauntless averaged 35.02 m.p.h. with and against the tide at 1305 r.p.m. and 27.34 m.p.h. at 1000 r.p.m. in trials following its launching from the Dauntless Ship Yard, Essex, Conn.

The boat was built for Roy T. H. Barnes, Hartford, Conn., who will offer it to the Government for war purposes. It is 45 ft. long, 8 ft. high, 10 in. in beam, and has a draft of 3 ft. The cabin is forward under a high crown deck. The entrance to the cabin is through the pilot house, which has great strength and minimum wind resistance. The cabin has sleeping accommodations for five persons.

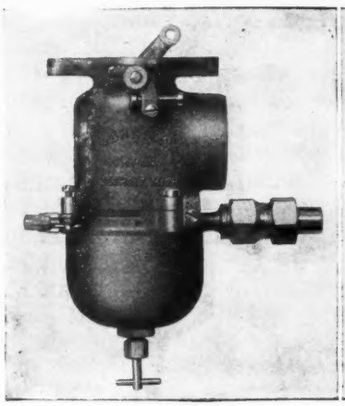
Abaft the pilot house is the engine room, 15 ft. long with a complete starting and lighting outfit. The engine room is covered by a removable mahogany house, with two entrances and is well lighted and ventilated. The finish of the superstructures is in mahogany.

Abaft the engine is an open watertight cockpit, extending to the stern. The exhaust pipe is a copper tube, 20 ft. long and 6 in. in diameter. The screw shaft is of bronze, 2 in. in diameter. The stem band is a bronze casting and the rudder is a solid bronze casting. The propeller is a Columbian Ailsa-Craig, 24 by 36 in., and was specially made by the Columbian Foundry, Freeport, L. I.

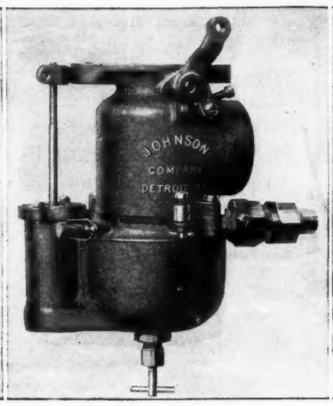
The boat is round bottom and was designed by Ernest N. Way, Hartford, Conn.

Within 10 min. after the launching the engine was started and the boat moved out into the river, and after a preliminary spin, made a short cruise with the launching party on board, consisting of Governor Holcombe, ex-United States Senator Morgan G. Bulkeley, ex-Governor Weeks, Rear Admiral William B. Cowles and E. P. Decker of the Duesenberg Motors Corp., together with C. A. Goodwin and the owner.

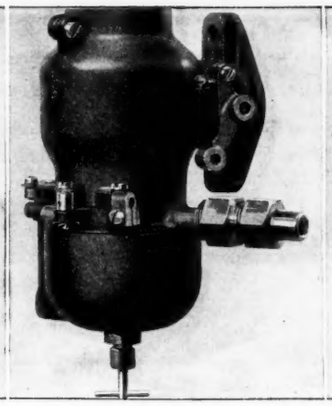
On the following day, after the speed trial, a run of 41 miles was made for gasoline consumption with the following results: Distance, 41 statute miles with and against the tide in fresh and salt; time consumed 1 hr., 40 min. Average speed 25 m.p.h. Gasoline consumed 27 gal. per mile, or 1½ m.p.g. Engine speed between 900 and 930. Following this run a trial at 1000 r.p.m., hand-indicated, was made over the measured mile, at 1000 r.p.m. at slack water, showing 2 min. 9 1/5 sec., with the tide and 2 min. 2/10 sec. against the tide, an average of 27.774 statute miles per hour.



Standard model A Johnson carbureter



V-engine type, with throttle pump on side



Standard model with side outlet flange

Reo type with limited adjustment range

Johnson Carbureter Idling Improved

IMPROVEMENTS have been made in the new Johnson carbureter to give a cleaner idling. In general principle the carbureter, which is manufactured by the Johnson Co., Detroit, is the same as the previous design. It is a gravity air valve type with a single concentric jet, in which the air valve is made up of a sleeve rising and falling by suction and gravity in the cylindrical passage above the jet.

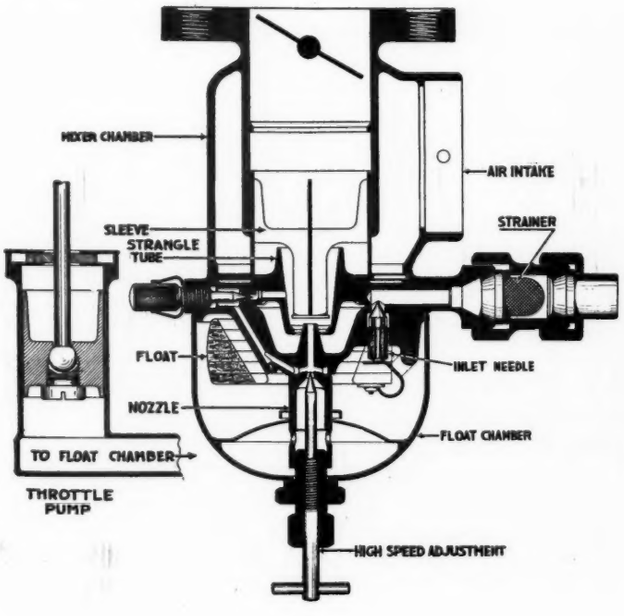
Improvement has been made by removing the idling passage from the space at the throttle and placing it in the strangle tube where the vacuum is considerably higher. In the Johnson carbureter there are three stages of vacuum, one in the space between the throttle and strangle tube, the second in the strangle tube itself and the third in the space below the plate on the bottom of the air valve sleeve. By removing the location of the idling adjustment, the flow of gasoline for this purpose has been brought into a zone of greater vacuum and hence better idling has resulted.

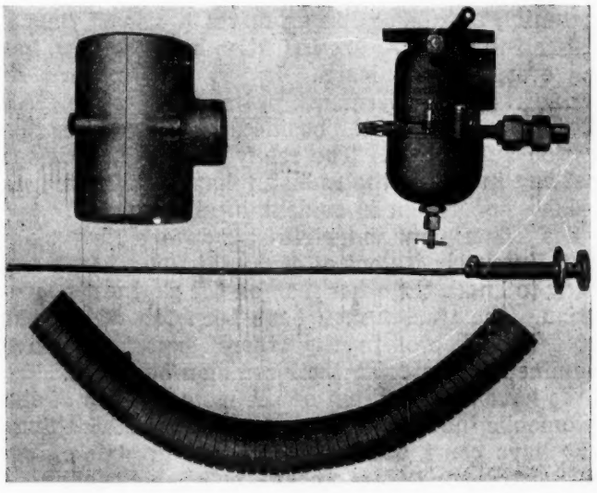
Another effect which the change has made is to render the idling adjustment altogether independent, as far as practical use is concerned, from the high speed adjustment, which is effected by the needle valve at the bottom of the carbureter. In the previous model the flow of gasoline for idling was controlled by the needle at the bottom with the adjustment solely for air. The result was that frequently the best possible idling adjustment could not be secured with the desired high speed setting. This is a difficulty which has been entirely removed by the new arrangement.

Another new feature of the Johnson line is the manufacture of complete sets, including carbureter, stove, hot-air tube and dash control for a number of standard models. These include the Overland 79, 80, 81 and 83; Studebaker 16, 17 and 18, series 4; Oakland light six; Maxwell 1915, 1916, 1917, and Ford.

On carbureters intended for V engines the Johnson Co. fits a throttle pump giving a quick supply of gasoline for acceleration. This is controlled by means of a vertical plunger, which operates in a cylinder adjacent to the float chamber. When the throttle is open the plunger is pressed down, forcing the gasoline through the jet. This gives the necessary rich mixture for quick acceleration. There is no difference in the working parts of the carbureters with and without the throttle pump. There is a change, however, in construction in that the float bowl is a stamping on the standard model, while on the model with the throttle pump the cylinder holding the plunger and the float bowl are cast together, and a baffle plate is soldered in the float bowl. This baffle plate is for directing the gasoline from the throttle pump to the jet.

The Johnson carbureter is standard equipment on the Oldsmobile eight, Oldsmobile six, Reo R and S, Premier and Apperson passenger cars and the Reo J and F trucks.





Above—Standard Johnson carbureter, stove, hot air pipe and dash control for Studebaker, Overland, Maxwell and Oakland cars

Left—Sectional view of Johnson carbureter, showing new location of idling adjustments and the throttle pump

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The Tractor Industry

THE meeting of the tractor industry at Fremont Aug. 6 to 10 will show many great changes which have taken place in the last twelve months. A year ago the tractor industry was an infant hardly out of its swaddling clothes; to-day it is walking and beginning to talk, and in an incredibly short time it will be full grown. The industry, being so new, has had everything to learn. It has had to learn its engineering, its salesmanship, its organization. Almost every detail of the business is a matter for discussion and debate. The really wonderful thing is the way in which the industry has consolidated, in which co-operation is evident in all branches.

Too often new industries produce a few rival firms, intensely jealous of each other, suspicious and ready to knock the other man on the slightest provocation. The tractor men have been too wideawake for this and, profiting by others' experience, have combined to overcome their common obstacles.

We have spoken often of the meteoric rise of the automobile industry, of the many remarkable things that have come about through the growth of co-operation among its members, but it bids fair that the tractor industry will begin where the automobile trade is now and will go on with it instead of trailing behind. It may even be that the tractor men will show a lead to their elder brother.

To Fremont are coming all sorts of men not connected with the industry, attracted by the great progress made, by the swift realization of the tractor's importance as a food producer. These men are wondering whether the tractor is not going to prove a good enough proposition to warrant their taking an active part in building up the business. They come from factories where tractors could be built, from selling houses, from banking firms, from the ranks of engineers of all kinds. The Freemont meeting is going to cause many a strong man of business to put his hand, if not to the plow, at least to the mechanical aid thereof.

Storage Battery Location

FROM time to time the question of storage battery location has cropped up as one of the most persistent problems that the chassis designer is compelled to face. The public has demanded free running boards, and for this reason there has been a decided drop in the number of batteries carried on them; simultaneously the under-the-seat method has grown in prominence.

Battery service stations have found, however, that the heat of the engine has a marked effect on batteries carried under the seats in the front compartment. If anyone has had occasion to touch his tools under the seat in the course of a run on a hot day, he undoubtedly has been surprised to find the amount of heat absorbed by them. If this heat reaches the tools in the compartment, wrapped in their case, it will reach the battery well to a much greater extent, and the result is that the water is evaporated at a very rapid rate and the instructions to the owner to refill his battery every 2 weeks are entirely inadequate.

This is a big problem because it involves millions of dollars' worth of property. Heat must be carried away from the battery, and the blast of hot air which comes from the engine is the worst medium that could be found to do it. If the battery must be carried under the seat let us have the air baffled so that cool and not hot air will strike the battery container well.

Airplane Steels

A GOOD deal has recently appeared in the British technical press regarding the steels used in airplane construction. When one considers that airplane engines are made of as low a weight as 2¾ lb. per horsepower, while automobile engines weigh 10 lb. and upward, it would seem that much better materials must be used in the former. Certainly the absolute necessity of light weight in airplane engines and the possibility of obtaining prices many times as high as for an automobile engine, on a horsepower basis, would permit of using steels which in automobile construction could not be considered on account of the cost. However, all of the steels known which have very high physical qualities are used to a greater or less extent in automobile manufacture. While the science of alloy steels has

by no means been developed to its ultimate limit, there are no alloys known that would be advantageous in airplane construction that have not yet been tried in automobile work.

There is, however, another side to the matter, in respect to which airplane steels may differ from automobile steels. It is known that the physical properties of a steel can be varied within wide limits by heat treatment. Limitations are placed on the heat treatment, however, by the necessity of working the steel after treatment. To keep down the cost of machining the heat treatment must be such that the steel remains relatively soft and cuts easily. Its full possibilities in the way of elastic limit, etc., therefore cannot be developed. But where cost of machining is a less serious factor, as in airplane engineering, the steel can be heat treated so as to possess higher physical qualities.

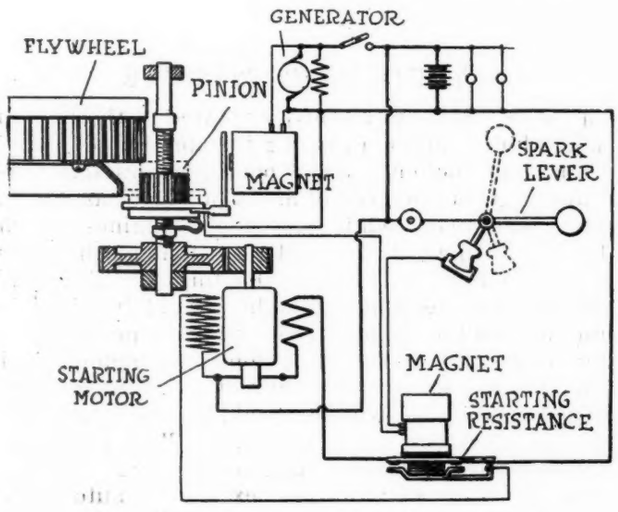
A great many screws and bolts enter into the construction of airplane engines. Thread-cutting is especially difficult in the high tensile alloy steels and the work requires several times as long to put through the automatic screw machine as does the ordinary carbon screw stock. But a better grade of material than the ordinary screw stock is absolutely necessary, and time must be taken to get the better product. In connection with screws it is of interest to mention that even in some of the high-grade automobiles the screws are drilled out from the head end to where the thread begins, to such a diameter that the unthreaded portion is no stronger than the threaded portion in respect to tension or shear. This not only removes superfluous weight, but eliminates any abrupt change in the effective section, which is always a cause of weakness.

Perhaps of all the metallurgical improvements that could be made the one that would most advance airplane production would be an improvement in tool steel, permitting of readily machining steel of a greater degree of hardness. Such an improvement would, moreover, benefit many other lines of industry as well.

New Bijur Starter Drive Patent of Broad Scope

PATENT No. 1,233,961, issued to Joseph Bijur, of the Bijur Motor Lighting Co., Hoboken, N. J., on July 17 last, on an application filed July 1, 1913, contains forty-two claims, covering many features of modern two-unit electric lighting and starting systems, as reported in THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES for July 26. About a dozen claims relate specifically to a form of starter which has come into use on some higher priced cars. Some of them involve the use of electromagnetic power to effect an engagement between the starter pinion and the flywheel gear, others an arrangement by which the excitation of the generator prevents the engagement of the gears while the engine is running, and one covers the interlock of the ignition switch and the starter. Other features claimed are an arrangement whereby the resistance in the motor circuit is automatically cut out and means for turning the pinion under low power before it meshes and increasing the power after the pinion is completely in mesh.

There is another line of claims in the patent relating to the action of the engine in regard to the disengagement between the pinion and the flywheel and to the gradual application of power to the pinion to start the engine. Others deal with an arrangement of the motor whereby with a weak field the pinion is moved into engagement with the flywheel, after which the field is strengthened so as to enable the motor to revolve the engine. Some of these claims specifically relate to the use of a threader shaft adapted to cause motion of the pinion in the direction of the length of the shaft to effect engagement, and to means for automatically preventing the engagement while the engine is running. A few claims cover the combination of an engine with a separate generator, including an automatic cutout, a storage battery and a self-meshing arrangement of the starter motor.



Principle of new Bijur starter drive patent

Among the most important claims are Nos. 14, 15, 32 and 38, which, respectively, read as follows:

"In apparatus of the class described, in combination, an engine, a generator driven therefrom, a storage battery connected to be charged from said generator, a member driven from said engine, a rotatable member, means energized from said battery for moving said second member axially into driving engagement with said first member, for rotating said second member to rotate thereby said first member and said engine, and for effecting the disengagement of said members automatically when said engine has started.

"In apparatus of the class described, in combination, an internal combustion engine, a generator, power-transmitting means between said generator and said engine whereby said generator is driven from said engine, a storage battery connnected to be charged from said generator, means adapted to make and break the connection between said generator and said battery, a gear driven from said engine, a pinion, an electric motor, a member driven from said motor upon which said pinion is mounted and adapted upon said motor being started to move said pinion axially into mesh with said gear, connections from said battery to said motor, and means adapted to make and break said connections.

"In apparatus of the class described, in combination, an internal combustion engine, a shunt-wound generator continuously driven from said engine during the movement thereof, a storage battery adapted to be charged from said generator, voltage-controlled means for connecting said generator to said battery, a motor having a series winding adapted to receive current from said battery, and connected thereto on the battery side of said voltage-controlled means, manually controlled means for connecting and disconnecting said battery from said motor, and means between said motor and said engine, said means when acted upon by said motor adapted to move one of the gears thereof into mesh and upon being acted on by said engine to move said gear out of mesh.

"In apparatus of the class described, in combination, an internal combustion engine, a battery, a motor deriving current from said battery, a gear connected with said engine, a threaded shaft driven from said battery, a pinion threaded upon said shaft adapted automatically to move into mesh with said gear as said motor is started, and to move out of mesh as said engine is started, means adapted gradually to increase the torque of said pinion, and means adapted to prevent re-meshing of said pinion after said engine is started and running."

This last claim reads on a certain application of the screw and nut type of starter pinion engaging mechanism. There are other patents out on this mechanism, and whether they are subsidiary to this patent or dominating is a question which cannot be decided offhand. At any rate the patent relates to many features now in practical use.

News of the Automotive Industries

Two S. A. E. Tractor Meetings

Dinner and Fuel Talks on Evening of Aug. 8—Service Session Aug. 9

NEW YORK, July 28—Instead of a meeting for one evening, two evenings will be required to take care of the activities of the Society of Automotive Engineers, during the National Tractor Demonstrations at Fremont, Neb., the week of Aug. 6-10.

On Wednesday, Aug. 8, in addition to the tractor dinner, the subject of fuel will be taken up.

The following evening, Thursday, Aug. 9, will be entirely devoted to tractor service. In addition to the paper on service to be presented by Dent Parrett, the following engineers have agreed to take part in the discussion on service:

L. B. Duntley, Emerson-Brantingham Co., Minneapolis, Minn.

S. C. Turkenhoph, Moline Plow Co., Moline, Ill.

C. B. Rose, Velie Motor Vehicle Co., Moline, Ill.

H. C. Merritt, Hart-Parr Co., Charles City, Iowa.

E. L. Woods, J. I. Case Plow Works, Racine, Wis.

H. C. Buffington, Minneapolis Steel & Machinery Co., Minneapolis, Minn.

G. T. Strite, Minneapolis, Minn.

Over 100 reservations have been made for the dinner Wednesday evening, Aug. 8, and it is expected that between 300 and 400 will attend. Upward of 100 engineers have already made reservations for rooms at Fremont during the week of the demonstrations.

Prominent Men Attend

How important the farm tractor looms as an industry upon the automobile horizon may be gathered from the list of prominent automobile manufacturers who will attend the national tractor demonstration at Fremont, Neb., Aug. 6-10. A number of parties have been announced, one of the largest being that of Alfred P. Sloan, Jr. The names include the following:

Roy D. Chapin, president of the Hudson Motor Car Co.; Otis C. Friend, president of the Mitchell Motors Co.; H. W. Griffith, general manager of the Remy Electric Co.; Walter P. Chrysler, president of the Buick Motor Co.; Harry W. Ford, president of the Saxon Motor Co.; Howard E. Coffin, of the National Defense Council; J. G. Heaslot, director of the Studebaker Corp.; C. W. Nash, president of the Nash Motors Co.; C. E. Mott, president of the Weston-Mott Co.; C. F. Kettering, vice-president of the Dayton Engineering Laboratories Co.; George W. Dunham, president of the S. A. E.; John W. Bate, general manager and chief engineer of the Mitchell Motors Co.; H. H. Bassett, general manager of the Buick Motor Co.; J. G. Weiss, works manager of the Hyatt Roller Bearing Co., and Henry W. Ewald, president of the Campbell-Ewald Co.

The party will leave Detroit Sunday evening, Aug. 5, in two special cars, will spend Monday in Chicago, where several members of the party will be met; will leave Chicago Monday night and will arrive at Fremont Tuesday morning; Tuesday, Wednesday and Thursday will be spent watching the tractors work and the return trip will be made Thursday night and Friday.

A number of prominent automobile men went to the demonstration at Fremont last year as the guests of Mr. Sloan and evinced much interest in tractors and tractor development. Other automobile men meanwhile have given their attention to the tractor and the party was enlarged this year to include them.

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Tractor Makers Raise Prices

CHICAGO, ILL., July 30—Tractor prices are being raised from time to time as conditions demand. The Wallis Tractor Co., Racine Junction, Wis., has advanced the price of its Wallis Cub, Jr., Model J, $100, making the list now $1,350 f. o. b. Racine.

The Huber Mfg. Co., Marion, Ohio, has advanced the price of the Huber light four tractor, which is $1,185, effective Aug. 1.

Those concerns exhibiting tractors at Fremont demonstrations Aug. 6-10, in many cases expect to show complete lines. Henry Ford & Sons, Dearborn, Mich., state that they will not have any tractors at Fremont.

The Rock Island Plow Co., Rock Island, Ill., has put on the market a new tractor plow designed to work with the Heider Model D tractor.

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One Chassis Only for Stanley

NEWTON, MASS., July 31—The Stanley Motor Carriage Co. will confine its production to a single chassis with a wheelbase of 130 in. The special over-size chassis and power plant for commercial service and buses will no longer be made.

—

British Embargo on Airplane Drawings

LONDON, July 21—Exportation of designs, drawings, specifications and other descriptions of airplanes or other aircraft or engines or accessories is prohibited by Great Britain.

5750 Truck Chassis Ordered

War Dept. Adds to 10,500 First Called For—Three Makes Only

WASHINGTON, July 28—The war department has ordered additional truck chassis to the 10,500 ordered 1 week ago as follows: Packards, 3000 B type or 3-ton; Locomobiles, 1250 B type or 3-ton; Pierce-Arrow, 1500 A type or 1½-ton. Major Drake, in charge of the purchasing branch, stated that these orders were given on the same conditions as those recently awarded, but that he had decided not to make public the prices paid.

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Reo Prices Advance

LANSING, MICH., July 30—Effective Aug. 1, the Reo Motor Car Co. has advanced its prices as follows:

Model "R" touring and Model "S" roadster, 4 cyl.	$985
Model "M" touring and Model "N" roadster, 6 cyl.	1,385
Model "F" ¾-ton truck roadster	1,125
Model "J" 2-ton chassis with driver's cab	1,800
Sedan	1,950

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U. S. Truck Raises Prices

CINCINNATI, July 28—Effective Aug. 15, the prices of U. S. trucks, produced by the United States Motor Truck Co., will be increased. The new scale of prices will be as follows: 2½-ton chain drive, $2,650; 3½-ton chain drive, $3,350; 2½-ton worm drive, $2,950; 3½-ton worm drive, $3,650; 5-ton worm drive, $4,550.

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Corporations Face Added Tax

WASHINGTON, July 30—Another shift in the tax situation as far as manufacturers are concerned occurred in the Senate finance committee to-day. The decision was reached to raise the war revenue bill tax levy by $273,000,000, so as to bring the aggregate up to $1,943,000,000. To get this increased amount it is planned to put all corporations which claim subnormal pre-war profits in the same category as new corporations in applying the war profits tax.

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100 Airplane Plants Busy in England

LONDON, July 6—No fewer than 100 English factories are engaged in some process or other connected with the construction and equipment of airplanes. A growing number of workers are employed in the airplane factories, the increase in the last 5 months being 25 per cent on the previous total.

More Standards for Aircraft

S. A. E. Standards Division Adopts Tension Wire Specification—Studies Steels

WASHINGTON, Aug. 1—The aeronautical standards division of the Society of Automotive Engineers has adopted specifications for the tension wires to be used in building and assembling airplanes, and it is giving attention to aeronautical steel specifications. The specifications to be adopted generally for the building of aircraft, it is announced, will be based upon the best modern practice and experience and they will be used as standards for machines for both the army and navy.

The aeronautical division believes that such standards will promote quantity production by simplifying the requirements to which material producers will have to conform.

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Curtiss Has $200,000,000 Order

BUFFALO, N. Y., July 30—The Curtiss Aeroplane Co. has received a $200,000,000 order for airplanes. The plant will be enlarged and 15,000 men will be employed. The Curtiss company has options on Buffalo land where $5,000,000 will be spent on a new plant if the option is taken up.

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Airship Plant Plans Held Up

TOLEDO, OHIO, July 31—Plans for the airplane engine and assembly plant of the Curtiss Aeroplane Co. in Toledo have been held up for 30 days.

This announcement was made last Thursday by John N. Willys, president. The unsettled conditions at Washington are responsible for the delay and it is possible that the larger amount of Curtiss planes will be constructed in the Buffalo plant.

The Willys-Overland Co. will continue the manufacture of battle planes, and Mr. Willys said he expected to turn out 3000 of them here the first 6 months of next year.

At the Buffalo plant, Mr. Willys says, the Curtiss company expects to turn out approximately half of the Government's needs. Already contracts which will mean more than $200,000,000 annually have been awarded to the Curtiss company.

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Curtiss Builds New Flying Boat

WASHINGTON, July 28—A new flying boat has been devised by the Curtiss Aeroplane Co. which is said to be well adapted to all the purposes of modern war in the air, and particularly to coast patrol.

The new hydroairplane differs from prevailing types by having its engine installed in the body of the boat, instead of over the operator's head. Another feature is an appliance which gives the operator power to cut loose entirely from the planes, throwing the power of his engine to a regulation marine propeller for aquatic propulsion. By this device it is expected that the perils of coast patrol duty will be eliminated to a large extent. If sudden gales should strike one of these planes while at sea it could be brought to the surface of the sea, where it could be converted into a motor boat.

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Airplane Engine Expert for War Dept.

WASHINGTON, July 31—The national advisory committee for aeronautics has secured for an indefinite period the services of Prof. Lionel S. Marks, head of the combined departments of mechanical engineering of Harvard University and Massachusetts Institute of Technology. He will be assigned to assist in the special work of the subcommittee on power plants, and will have charge of certain investigations relating to airplane engine design conducted by this committee at the Bureau of Standards.

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IMPORTANT CHANGES IN AIRCRAFT BOARD PROBABLE

WASHINGTON, July 31—That the enactment into law of the aircraft appropriation bill will have the result of making important changes in the character of the aircraft production board of the Council of National Defense both as to its personnel and as to its authority and functions is considered certain. The aircraft production board is to be known in the future as the aviation section of the signal corps, according to competent authority. However, the change will not deprive it of the services of the experts drawn from many lines of industry who are now connected with the board. Howard F. Coffin is expected to continue as civilian chairman of the aviation section with E. A. Deeds and H. G. Vincent, who are to be commissioned majors. It is understood in the same section other technical men drawn from civil life to assist in the aircraft production work have already been commissioned officers and still others in addition to Messrs. Deeds and Vincent most probably will be given commissions.

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Would Co-ordinate Navy and Army Aviation Departments

WASHINGTON, July 28—A substitute to the Sheppard-Hulbert bill creating a department of aeronautics, submitted by Representative Murray Hulbert of New York, which is under consideration by the Senate committee on military affairs, would make official and thereby end all question as to the authority of the Aircraft Production Board of the Council of National Defense.

To accomplish this end, Representative Hulbert would co-ordinate the activities of the war and navy departments in connection with aircraft, and he would follow pretty closely the lines of the English plan. Both Secretary of War Baker and Secretary of the Navy Daniels have consistently opposed the original Sheppard-Hulbert measure, but they are now said to favor the substitute of Mr. Hulbert.

Airplane Makers to Aid U. S.

Cross Licensing Agreement Reached—Manufacturers' Aircraft Assn. Formed

WASHINGTON, July 31—In view of several erroneous statements which have been made in the public press, relative to the Manufacturers' Aircraft Assn., THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES prints the following statement issued by the Chairman of the Publicity Committee, Fay L. Faurote:

At a meeting held July 24 in the law offices of Crisp, Randall & Crisp, the well-known patent attorneys, the airplane manufacturers of the United States pooled their patent interests for the good of Uncle Sam and formed a new organization known as the Manufacturers' Aircraft Assn., Inc. By the terms of their agreement the various patents owned by the individual members are to be taken over and so cross-licensed that their use may be made universal to all engaged in the industry. This action comes as a result of a number of conferences held in Washington by the members of the National Advisory Committee for Aeronautics and the officials of the Army and Navy and the Manufacturers' Aircraft Assn.

Subcommittee on Patents

In January, 1917, the Secretary of War and Secretary of the Navy requested the National Advisory Committee for Aeronautics to investigate the aircraft situation and recommend a solution for the problem in patent litigation which had arisen between the Wright-Curtiss Corp. and the Curtiss Aeroplane & Motor Corp. As a result of these meetings a special sub-committee on patents was established at a regular meeting of the Executive Committee on Feb. 10, consisting of Messrs. Charles D. Walcott, chairman; S. W. Stratton, S. D. Waldon and Lieut. J. H. Towers, U. S. N. In May, 1917, Judge W. Benton Crisp, Frederick P. Fish (Mr. Fish was not able to serve and, therefore, Charles Neave, his partner, acted in his place) and W. F. Durant were added to the subcommittee on patents, the latter serving as acting chairman.

Previous to this time, Howard E. Coffin, chairman of the Aircraft Manufacturers' Board, and a member of the Council of National Defense, and Sydney C. Waldon of the Aircraft Production Board had had several conferences with the aircraft manufacturers, and at the time of the aeroplane show in New York suggested an association which later was formed under the name of the Aircraft Manufacturers' Assn. Meetings were held in Washington on March 23, June 18 and July 10, 11 and 12, to which representatives of the Aircraft Manufacturers were invited. After many weeks of consultation and deliberations between the interested parties, an

(*Continued on page* 210)

Increased Gasoline Buying Needed

H. L. Doherty Differs with A. C. Bedford—Money Needed for Production

NEW YORK, July 30—Henry L. Doherty in a statement to the public takes issue with the recent statement made by A. C. Bedford, who would stop pleasure riding to win the war. Mr. Doherty, in a letter to THE AUTOMOBILE and AUTOMOTIVE INDUSTRIES believes that the threat of curtailing the liberal use of gasoline at high prices will still further intimidate oil producers and curtail drilling. In his letter Mr. Bedford states:

"The difficulty in securing casing, the high cost of casing and labor, the difficulty of securing labor and the difficulty of transportation, together with the disposition on the part of the Government to exempt nothing more in the proposed Excess Profit Tax for the hazardous business of prospecting for oil than is exempted for the insurance, banking and other forms of less hazardous business, presents an extremely serious problem which may lead to an early oil famine. It is a subject that should be given deep and earnest consideration.

"Drilling is being curtailed at an alarming rate. The Government officials are so taxed with a multitude of duties and callers that it is impossible for them to grasp the seriousness of the situation and the dire results which may follow.

"To expedite the huge problems which confront us our Government is apt blindly to follow the example of the other countries that have been longer at war. Our conditions are vastly different. We have millions of acres of prospective oil territory. There is practically no limit to the oil we can produce, although the cost of oil may become prohibitive if a long period of inactivity should be brought about by a failure quickly to comprehend the true situation.

"Other countries have been compelled to curtail the use of gasoline because their supply was limited and needed entirely for the Government's use. The deficiency in ocean transportation is alone enough to prevent these countries from securing an adequate supply of oil for normal uses. In our country the situation is different. It is purely a matter of cost.

Legislation Handicap

"Capital must always bear its own losses. One of the questions of the oil prospector now is, how much of his profits will be taken by the Government if his prospecting leads to a profit? This uncertainty as to legislation is a great handicap to all forms of business, but not such a great threat to the public's welfare in other lines of business as in the oil business.

"There is seldom enough oil above ground to supply the consumption for 6 months. Supplies are only maintained by constant fresh drilling and new prospecting. Every day of hesitation brings us closer to an oil famine.

"I cannot concur in the theory that a restriction in the use of gasoline for cars, either by law or by creating adverse public opinion, will help solve our problem. In fact, I believe it will precipitate it. The threat of curtailing the liberal use of gasoline at high prices will still further intimidate oil producers and curtail drilling.

No Fear of Oil Famine

"If the situation is handled with reasonable wisdom and despatch there need be no fear of an oil famine, and the danger of a gasoline famine would be still more remote.

"There is no disposition on the part of the oil men to hold up the public as to price. Oil is not selling to-day as high as it would be selling if we had normal business conditions and no war. While it is proposed to guarantee the farmer $2 for wheat, with no excess profit tax, the oil men have maintained prices as close to the cost of production as though no war existed.

"The oil business as a whole is not as profitable as the public has been taught to believe. The huge profits of the successful oil operators are constantly brought to the attention of the public, but nobody figures the amount of money that is sunk each year in unprofitable ventures. When rewards come, they come big; but losses are generally 100 per cent. It is the huge profits when a lucky strike is made that stimulates the search for new fields and the enormous loss which this often entails.

"The ever present possibility of loss, which is now greatly accentuated by the existing markets for labor and materials and the uncertainty of supplies, is one side of the picture. The certainty of a heavy excess profit tax and individual income tax is the other side of the picture.

"The traditional order of things frequently leads us to continue to waste at the bung while we save at the spigot. For instance, every ton of coal we carbonize to make gas for town distribution produces in the gas about 2½ gal. of benzol and toluol. The bulk of all of this gas is used for fuel purposes. The benzol and toluol has no more value in the gas than an equal amount of cheap fuel oil or the commonest kind of a substitute gas. Commercial benzol and toluol sold for less than the price of gasoline prior to the European War. The Government now pays from $1.80 to $2.05 a gal. for toluol for explosives.

"Not 1 ft. out of a thousand of the gas distributed for town use can be properly used and secure any advantage from the benzol and toluol content; and yet we continue to maintain the candle power standards adopted before gas was used for fuel purposes or before the mantle was invented, even though an abolition of the candle power standard for gas would give us all the benzol and toluol needed for explosives at a price lower than the price paid for gasoline—and would also give us an enormous quantity of benzol and toluol as a substitute for gasoline as motor car fuel. It not only can be used in all of our existing motor cars, but it actually has a higher fuel value than gasoline. It would also be thoroughly practical to operate bus lines and taxicabs with compressed town gas.

"The present situation can be met, and with ease; or, for lack of forethought, an oil famine can be precipitated with still greater ease."

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Gasoline Prices Show Stability

NEW YORK, July 28—Despite the fact that there has been a threatened seriousness in the gasoline situation, there has been no advance in the price of many sections of the country and only slight increases in other sections in the last 5 or 6 months.

Not in recent years has there been such a steady price for gasoline as has prevailed since practically the first of this year. Comparison of the present price with February's in some of the larger cities will show the stability of gasoline prices:

	Current Price	Feb. Price
Atlanta	26	26
Baltimore	22	22
Birmingham	26	26
Boston	25	24
Charleston	25½	25½
Chicago	20	19
Dallas	23	22
Denver	24	23
El Paso	25	22
Hartford	24	23
Minneapolis	21	20
New York	24	23
Newark	22	22
New Orleans	22½	22½
Oklahoma City	24	23
Philadelphia	23.4	23
Richmond	22½	22½
Wilmington	23.4	23

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Canada May Control Use of Gasoline

MONTREAL, QUE., July 27—Joy riding and long motor trips in Canada may be eliminated if the fuel controller carries out plans he has under consideration. This drastic course would be to conserve the gasoline supply for the needs of the armies in England and France, and of necessary industries in Canada, particularly western agriculture, which is beginning to absorb vast quantities of gasoline for needless automobile riding.

Steel Supply To Improve

Christian Girl Believes Filling of Government's Wants Will Better Conditions

CLEVELAND, July 31—Maintenance during the next 6 months of the activity which characterized the automobile and allied industries during the first half of 1917 will depend to some extent, says Christian Girl, president of the Standard Parts Co., upon ability to get raw materials. Mr. Girl adds:

"It is conceded that the Government's requirements must be first supplied, but directly these requirements are settled upon and placed the situation will, in our opinion, show marked improvement, not through greater production in the steel mills, but because the mills will be able to arrange and live up to more definite schedules.

"The same reasons will make the available man power more effective, for in all activities definite schedules are more conducive to large volume production and distribution than indefinite schedules.

"The business of building automobiles has kept safe and sane. And while demand for high-priced passenger cars has to some extent lessened, there remains a very fair volume and such lessening as has occurred is, in the industry as a whole, appreciably offset by the greater demand for trucks and for low-priced cars.

"From the standpoint of the parts maker, the demands of the motor vehicle industry have been augmented by the requirements of tractor and airplane builders.

"Contemplating the next six months and more distant future, we believe the tractor will enormously supplement both man and horse power in farm operations. The airplane, to be so largely manufactured for war purposes, will develop the airplane of practical utility in peace. Automobiles and motor trucks which now supplement the facilities of transportation, relieving in no small measure the overtaxed railroads, are and will be a necessity on which more and more dependence will be placed.

"The success of the Liberty loan and bright crop prospects are still other important indices of the business activity the present and future will both require and produce.

"The Standard Parts Co. looks for steadily increasing production and volume of sales for the remaining half of this year. Our expectation is justified by the showing of orders on the books July 1.

"We believe that the situation is fairly representative of the country's business as a whole."

—

Tentative Program of N. A. P. A. Congress

PITTSBURGH, July 31—The National Assn. of Purchasing Agents, which will hold its annual congress in this city, Oct. 9, 10 and 11, has announced tentatively its program for that event. There will be business sessions for the mornings and visitation and inspection of industrial works during the afternoons. Special features include a tour of Pittsburgh's principal business districts by automobile during the late afternoon of the first day and a cabaret dinner in the evening at one of the country clubs. The banquet will be held at the Convention Hotel, Oct. 10.

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First Templar Car Out

CLEVELAND, July 31—The first Templar car, produced by the Templar Motors Corp., has made its appearance here. The company is making no public announcement until late in the fall. The factory building is well under way, and the first unit will be completed in about 60 days. In the meantime, the cars are being put through the shops of the S. P. Manufacturing Co. A. M. Dean is chief engineer. Mr. Dean was formerly chief engineer for the Ferro Machine & Foundry Co.

The officers of the company are: M. F. Bramley, president. Mr. Bramley is also president of the Cleveland Trinidad Paving Co.; president the Luna Park Amusement Co.; executive chairman the Land Title Abstract Co. W. J. Hunkin, vice-president. Mr. Hunkin is also president of the Hunkin-Conkey Construction Co.; vice-president Cleveland Builder's Supply Co. D. C. Reed, treasurer. Mr. Reed is president of the Lakewood State Bank; vice-president of the Colonial Savings & Loan Co.; president Medina County Creamery Co. J. E. Mathews, secretary. Mr. Mathews is former State Senator; senior member of firm of Mathews, Orgill & Maschke, attorneys. W. O. Cooper, organization manager. Mr. Cooper was former sales-manager International Text Book Co., and the National Cash Register Co.

—

800,000 Is Expected Ford Output

DETROIT, Aug. 1—The Ford Motor Co., though shut down for its usual inventory and machinery repair period, is operating with a force of 25,000 men 11,000 having been temporarily laid off.

Aug. 1 the company was 80,000 cars behind orders with no prospect of catching up.

A statement for the past fiscal year may be expected from the company within the next 30 days following the taking of inventory and the receipt of reports from the company's branches. The statement will probably display an extraordinary production. The company has been producing cars at a rate of more than 3300 per day for the last 60 days and it is likely that the report will show that close to 800,000 cars have been sold as compared with 533,921 for the fiscal year ending in July, 1916.

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J. W. Murray Earns 60 Per Cent

DETROIT, Aug. 1—The J. W. Murray Mfg. Co. shows earnings of 60 per cent on the company's outstanding stock of $700,000 in the past fiscal year. Most of the business has been done with General Motors, Chevrolet, Paige and Studebaker. Its balance sheet shows $1,101,761 assets up to June 1 this year. The current assets were $623,499. The current liabilities are $247,849 and the net working capital is $375,650. With the sales aggregating $93,944 for the year 1913, the company shows a steadily increasing volume of business to $1,000,000 in 1916. For the first 6 months of 1917 the sales aggregated $954,000, showing a net profit of $108,000.

Besides the dividend of 100 per cent stock issued on Jan. 1, this year, the company is paying cash dividends of 16 per cent for the year in quarterly installments of 4 per cent.

To Supervise War Buying

Federal War Industries Board Formed to Decide Priority of Manufacture

WASHINGTON, Aug. 1—The creation of a federal war industries board to supervise buying and to decide priority of manufacture and shipment as announced by the Council of National Defense is expected to result in immediate and important adjustments of problems which up to this time have faced manufacturers of many articles vital to the prosecution of the war, one of these being tractors. Also, this new board will handle the question of providing the supplies and also the transportation facilities for the carrying out of the great aircraft building program now under way.

The creation of this board does away with the general munitions board, but Frank A. Scott of Cleveland remains chairman, and all the duties of the munitions board will be taken over by the new organization.

There is little doubt that materials needed for the production of airplanes will be given priority in shipment over other materials for less important purposes, and that the long-delayed furnishing of materials for the making of tractors also will be rushed. The normal output of tractors for farm purposes alone for the calendar year, Jan. 1, 1917-Jan. 1, 1918, according to H. L. Horning, representative of the tractor interests of the Co-operative Committee on Automotive Transport of the Council of National Defense, should be at least 50,000, but Mr. Horning expects it to be at least 30 per cent short.

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Marathon Tire Defers Dividend Action

CUYAHOGA FALLS, OHIO, Aug. 1—The Marathon Tire & Rubber Co. has deferred dividend action. The company states that business this year is better than last, but the additional working capital is needed. A meeting of the stockholders is called for Aug. 30 to vote on an increase of the authorized capital stock from $1,000,000 to $1,500,000, of which $500,000 will be 7 per cent cumulative preferred. It is planned to offer $150,000 worth of stock in the near future.

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Indictments for Misuse of Mails

NEW YORK, Aug. 1—The Federal Grand Jury has handed down indictments against the Ford Tractor Co., a South Dakota concern; the Ford Tractor Co., of Delaware; the Emerson Truck and Tractor Co.; the Robert P. Matches Co., William B. Ewing, president of the second concern; Willis G. Emerson of the Emerson company; N. F. Wilson, R. P. Matches, T. A. Campbell and G. N. Campbell. All are accused of misusing the mails.

Metz Tractor and Truck Unit

$350 for 1-Ton Truck—Production Already Under Way—Chain Driven

WALTHAM, MASS., July 30—The Metz Company is about to embark on the manufacture of a truck unit for converting new cars or used cars into high duty 1-ton trucks and to also manufacture a tractor. The truck unit will sell at $350 and production is to start immediately. Different models of this truck unit will be made to meet the needs of varying transportation conditions.

The unit has a 5-in. frame, 2½ in. wide springs, external and internal brake on rear axle and 2½ in. solid duty axle. It is to be put out in both chain drive and internal gear models, while plans are rapidly being formulated for a universal rear end to fit any large geared car for 2-ton construction. The frame length is 168 in. and the width 32 in. The gear ratio on the sprockets is standard eighteen teeth on the jack-shaft and forty teeth on the rear.

The loading space is 9 ft. to 12 ft. back of the seat, depending upon the body. The wheelbase when attached to a Ford chassis is 125 in.

The tractor will be a replica of the tractor that Charles H. Metz made for the committee of public safety to plow up unused land. It will be known as the Metz Convertractor and can be attached to the front end of any make.

Airplane Makers to Aid U. S.

(*Continued from page* 207)

agreement was drafted by Mr. Crisp and Mr. Neave and reported to the Executive Committee of the National Advisory Committee for Aeronautics, which agreement was finally approved by the Executive Committee. When these negotiations were started the task of bringing all of the parties interested together seemed unsurmountable, but actuated by patriotic impulses it was at last agreed at the last regular meeting of the Aircraft Manufacturers' Assn., held in Washington, that the cross-licensing agreement and license be completed and a recommendation made for the formation of a corporation under the laws of the State of New York to be known as the Manufacturers' Aircraft Association, Inc. This recommendation was followed and for the purposes of keeping the organization free from partisan influences in order that the best interests of all stockholders thereof might be managed and directed during the first 5 years of its existence under a definite and fixed policy, it was decided to place the control of the association in the hands of three voting trustees, consisting of Judge W. Benton Crisp, Joseph S. Ames, the professor of the Department of Physics of Johns Hopkins University who it will be remembered was recently sent abroad by President Wilson as a member of a commission delegated to investigate scientific subjects, and Albert H. Flint, well known as the vice-president of the L. W. F. Engineering Co. and the vice-president of the Aircraft Manufacturers' Assn.

Of these three, one represents the Manufacturers' Aircraft Association, Inc.; one the Curtiss-Wright interests and the third is a neutral elected by the other two.

The directors of the association are: Frank H. Russell of the Burgess company of Marblehead, Mass.; Albert H. Flint of the L. W. F. Engineering Co.; John P. Tarbox of the Curtiss Aeroplane and Motor Corp.; Harry Bowers Mingle of the Standard Aero Corp.; B. S. Foss of the Sturtevant Aeroplane Co.; George H. Houston of the Wright-Martin Aircraft Corp., and H. E. Talbor, Jr., of the Dayton-Wright Aeroplane Co.

The officers of the association are: Frank H. Russell of the Burgess company, president; Albert H. Flint of the L. W. F. Engineering Co., vice-president; Harry B. Mingle of the Standard Aero Corp., treasurer, and Benjamin S. Foss of the Sturtevant Aeroplane Co., secretary, and Benjamin L. Williams, assistant secretary.

Judge W. Benton Crisp, one of the trustees, well known as Henry Ford's attorney in the Selden patent case, the counsel for Curtiss in the Wright-Curtiss litigation and representative of the Hudson interests in the Hudson crankshaft case, was retained as general counsel.

By the terms of the cross-licensing agreement any responsible manufacturer of aircraft, or one who intends to become a bona fide producer of same, or any manufacturer to whom the United States Government has given a contract for the construction of ten or more airplanes, or any person, firm or corporation owning or controlling United States patents relating to airplanes may become a party to the voting trust agreement, provided for in the by-laws, and can qualify as a member.

It is the purpose of the association not to curtail, but to open up the industry in order that the Government officials and airplane manufacturers may not at this time be under any improper or unfair restraints.

All patent litigation relating to airplanes between members of the association ceases automatically and the aeroplane industry is therefore left free to expand to any limits desired or required.

Spruce for Airplane Production

Prices and Specifications Submitted to Government by Lumbermen

WASHINGTON, July 28—As a result of a conference between representatives of spruce manufacturers of Oregon and Washington, of the Signal Corps, the Aircraft Production Board, the Lumber Committee of the Council of National Defense and of the British, French and Italian Commissions, in this city during the past three days, the government has been offered all the spruce necessary for the aircraft production program of the coming year at $105 per thousand feet. This is said to be only half the price which has been paid by most airplane manufacturers recently. The same price will be made to the allied governments.

Specifications Proposed

The specifications which have been proposed by the spruce men and which received the informal approval of the Government's representatives present are as follows:

Thickness—2 to 6 in., inclusive. At least 60 per cent to be 3 in. and 4 in. thick. Not more than 40 per cent 2 in., 5 in. and 6 in. thick.

Width—All to be 4 in. and wider; not over 10 per cent under 5 in. wide.

Length—Fifty per cent to be 19 ft. and longer. Fifty per cent to be 4 ft. and longer.

Measurement—Width and thickness fractional. Lengths in multiples of 1 ft.

Grain—All lumber 3 in. and thicker shall be not less than 70 per cent vertical grain of an angle of 45 deg. to 90 deg. on each carload. All lumber 2 in. thick shall be not less than 30 per cent vertical grain of an angle of 45 deg. to 90 deg. on each carload.

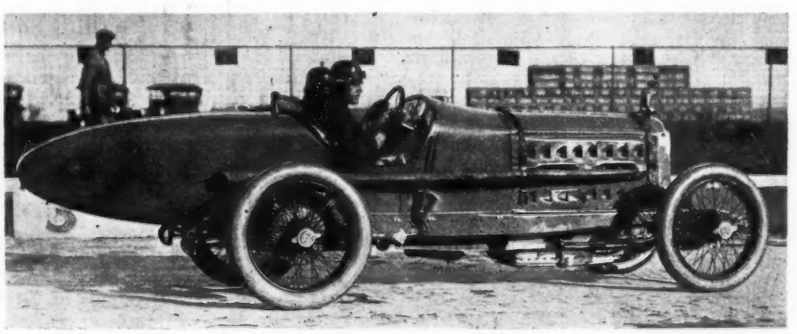
Grades—The grades agreed to are as follows:

Grades Agreed Upon

The 50 per cent of all lumber 18 ft. and longer shall be clear four sides, straight grained, not less than six annular growth rings for each 1 inch, sound and well manufactured, free from shakes, spiral and curly grain.

This grade will admit of bright sap, wane, pinworm holes, slight variations in sawing, or other defects that will not impair its use for wing beams.

The 50 per cent of all lumber 4 ft. and longer shall yield clear cuttings, straight grained, not less than six annular growth rings per each 1 in., sound and well manfactured, free from shake, spiral and



Record-breaking Packard racer, fitted with twelve-cylinder aviation engine

curly grain; some may contain knots, pitch pockets, wane, pinworm holes, slight variations in sawing, and other defects that will not impair its use for the purpose intended, providing, however, that each piece must produce, for buyer, clear straight grain, cuttings from 4-ft. to 17-ft. lengths, which shall not include over 5 per cent of such cuttings 4 ft. to 7 ft. inclusive.

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Dayton Firms Get Parts Contracts

DAYTON, July 30—The National Cash Register Co. has received a large Government order for airplane parts. It is said that by Sept. 1 the company will employ upward of 6000 men, both skilled and unskilled. It is reported that the plant of the Domestic Engineering Co. at Moraine City will be turned over to the local airplane company for the manufacture of machines.

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Aero Recruit Age Limit Lower

PLATTSBURG, July 28—The age limit for training candidates who desire to take up aviation has been changed to 19 years minimum, 30 maximum. It was 21 to 25.

13 Records for Packard

265 Hp. Aviation Engine Takes Car at 130-M.P.H. Gait at Sheepshead Bay

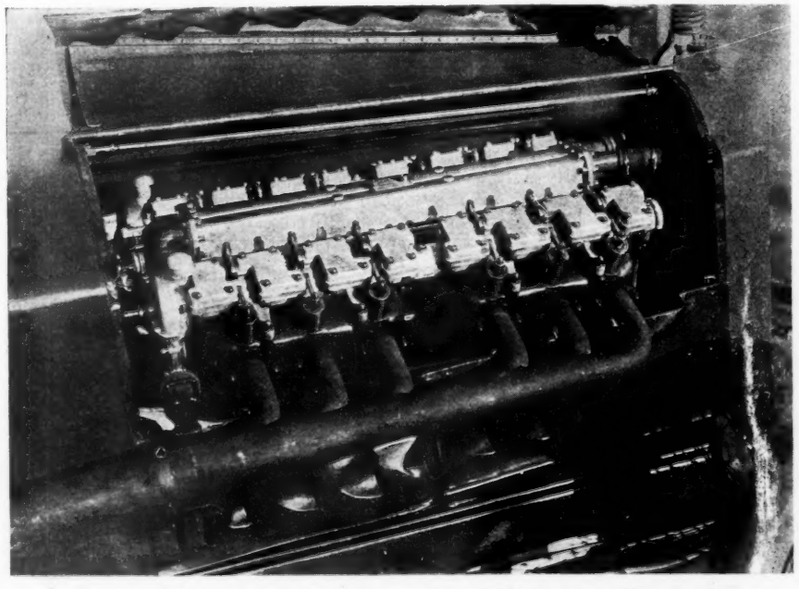
NEW YORK, July 28—All existing circular track records from ¼ mile up to 10 were broken yesterday and to-day by a Packard equipped with an aviation engine of 265 hp. and driven by William Rader at the Sheepshead Speedway. This engine was designed by J. G. Vincent for the Government. The mark of 58.2 sec. for 2 miles, established by the same car last week, was also broken. To-day's trials came near eclipsing the straightaway records made on the Ormond-Daytona beach and including the kilo, 1, 2 and 5-mile marks. It is stated that the car will be taken to Salt Lake City, where it will be driven over the salt beds for further new records.

As in former trials held on the Sheepshead Speedway this year by the Packard company, the car was actually driven 400 ft. in addition to the distance credited by the American Automobile Assn. for each 2 mile lap, being forced to hug the upper part of the track on account of the terrific speed.

The fastest time to-day was that made in the ¼-mile trial, negotiated in 6.9 sec., or 130.4 m.p.h. The ½ mile was done in 13.95 sec., or 129 m.p.h. and the mile in 28.76 sec., or 125.1 m.p.h. The 10-mile record was made in 4:50.88 or 123.7 m.p.h. Though these records have not as yet been passed on by the Contest Board of the American Automobile Assn. to make them official, it is likely that they will be passed. A comparison with the Brooklands records shows that all records for these distances made there have also been broken, thus making these world's records for circular courses. The kilo of 15.88 made by Burman in the Benz at Daytona, Fla., April 23, 1911, the mile of 25.40, also made by Burman in the Benz there on the same date and the 2 mile of 51.28 sec. made by him that date, still are the fastest times ever made by automobile. Hemery's 5-mile mark of 2.34 made in the Darracq at Daytona Jan. 24, 1906, has been broken. There is no straightaway 10-mile mark for comparison. The accompanying table will give a comparison of the new records with the old American and Brooklands marks.

Records Established by Packard Aviation Twelve

Distance	Time	Former American Record	Former Brooklands Record
1-4	6.9	8.16, Burman in Benz at Indianapolis, May 28, 1911	None
1-2	13.95	16.60, Oldfield in Christie at Tacoma, July 5, 1915	14.07, Hemery in Benz, Nov. 8, 1909
Kilo	17.35	21.40, Burman in Benz at Indianapolis, May 29, 1911	None
Mile	28.76	31.60, Oldfield in Christie at Tacoma, July 5, 1915	29.01, Hornsted in Benz, June 24, 1914
2	57.81	1:10 Oldfield in Christie at Tacoma, July 5, 1915	58.99, Hornsted in Benz, Jan. 14, 1914
3	1:26.6	1:54.83, Bragg in Fiat at Los Angeles, May 5, 1912	None
4	1:55.74	2:33.37, Bragg in Fiat at Los Angeles, May 5, 1912	None
5	2:24.66	3.00, Orr in Maxwell at Omaha, July 5, 1915	2:35.08, Hornsted in Benz, Jan. 14, 1914
6	2:53.87	None	None
7	3.22.71	None	None
8	3:52.41	None	None
9	4:21.52	None	None
10	4:50.88	7:54.40, Mulford in Hudson at Sheepshead, No. 25, 1915	5:19.78, Hornsted in Benz, Jan. 14, 1914



Twelve-cylinder Packard aviation engine which broke world's records

New Home for Pennsylvania S. A. E.?

PHILADELPHIA, July 30—The Engineers' Club of Philadelphia, with which is affiliated the Pennsylvania section of the S. A. E., started a 5-day campaign on July 20 to raise $75,000 for a new home on the present site at 1327 Spruce Street. The present membership is 2400, and is much too large for the present quarters.

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35 M.P.H. West Virginia Limit

CHARLESTON, W. VA., July 30—The State Road Commission, under the acts of the Regular Session, has issued a new set of traffic regulations, automobile registrations, etc. Under the new law no person shall operate a car at a greater rate of speed than 35 m.p.h. Cities, villages or towns, however, have the right to prescribe regulations relative to the speed at which such vehicles shall be operated. No vehicles are allowed to stand on the streets without first tying, locking or taking other reasonable precautions to prevent such vehicle from being started in itself. The age limit has been set at 14.

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83 M.P.H. Covered by Chalmers in Test

NEW YORK, July 31—A stock Chalmers chassis, driven by Joe Dawson, with a six-cylinder 3¼ by 4½-in. engine on Saturday set up new records for 100 miles and 1 hr. The 100-mile distance was covered in 1:11:53.5, which is at the rate of 83.46 m.p.h.; the car covered 83 miles 2889 ft. in 1 hr. The tests were made on the Sheepshead Bay Speedway and were officially observed and timed by the American Automobile Assn.

Test Headlight Devices

38 Companies Show Lenses at State Federation in Syracuse

SYRACUSE, N. Y., July 30—Thirty-eight devices designed to make headlamps comply with the requirements of the Hewitt bill, which becomes effective Aug. 1, were tested Friday night by the New York State Motor Federation in the Syracuse University Stadium. Of these, twenty-five already have been recommended by the testing committee as complying with the law. Several others are still in the hands of the testing committee.

What weight the recommendations of the testing committee will have is a question. It is expected, however, that because of the influence of the New York State Motor Federation, police authorities may be guided to a certain extent by such recommendation.

No little confusion has been apparent ever since the passage of the Hewitt bill, and so that its provisions might be better understood and automobilists have a better chance of complying with the measure, the lawmakers decided not to enforce its provisions until Aug. 1, though it was originally scheduled to become effective July 1.

Secretary of State Hugo has repeatedly stated that the state department has no authority to pass upon any paricular device. This has left all decisions as to whether lamps glare or don't glare up to police authorities. In view of this fact the New York State Motor Federation staged this test which was designed to demonstrate the effectiveness of various headlamp devices in controlling light rays to comply with the law.

The technical observations were made by a committee including George C. Diehl, chairman of the good roads committee of the American Automobile Assn.; Bradford Devine of Utica and C. A. Halverson of Lynn, Mass., an electrical engineer. John J. McInerney, of Rochester, general counsel of the New York State Motor Federation, served as counsel for the technical committee.

In conducting the test a large white sheet was placel before the car at a distance of 75 ft. from the radiator. A black line 42 in. from the ground marked the highest point on the sheet over which a direct ray of light could not reach and come under the law. Another object was placed 250 ft. from the radiator. It was necessary that the light disclose this.

It was necessary, also, that each light throw a reflection 10 ft. at the side of the car at a point 10 ft. in front of the radiator.

In testing the lights at the 75 ft. mark it was necessary for the committee to decide whether there was a direct beam of light over that 42 in. mark, or whether only diffused rays without any great glare were passing over the line.

The Stadium was an ideal place for the test. There were no lights other than those on the competing cars. There was some moonlight early in the evening. The thirty-eight cars were lined up on the track in the stretch before the grandstand, the lights throwing their rays toward the bleachers on the opposite side. There was no traffic to contend with during the tests, making conditions practically ideal.

Although last night's tests have no actual weight in determining what lights are permissable under the stipulations of the Hewitt bill the statement of comparative efficiency will make a material difference. The test was conducted by the New York State Motor Federation merely to help its members and select devices that will meet with the statute requirements.

More than 100 automobile and accessory men from all parts of the country were brought to the city for the occasion, this test being considered of utmost importance to the trade.

Devices Recommended	Maker and Address
Conophore (clear and Noviol)	Corning Glass Works, Corning, N. Y.
Warner	Warner-Lenz Co., Chicago.
Letts	Manifold Heater Co., Cortland, N. Y.
Rand	Rand Mfg. Co., Haverhill, Mass.
Glare screen	Palmer Glare Screen Co., Cleveland.
Offset	G. T. Sutterley & Co., Philadelphia.
Stryker	C. L. Stryker, Buffalo.
Ames	Heinze Electrical Co., Lowell.
Pennock	Specialty Mfg. Co., Minerva, Ohio.
Tilting reflectors	Cadillac Motor Car Co., Detroit.
Star	Lancaster Lens Co., Lancaster, Ohio.
No-glare	No-Glare-On Co., Watertown, N. Y.
More-Lite (clear and amber)	L. E. Smith Glass Co., Mt. Pleasant, Pa.
Da Lite	Jeannette Toy & Novelty Co., Jeannette, Pa.
Saferlite	Saferlite Lens Co., New York.
Primolite	Standard Glass Specialty Co., Morgantown, W. Va.
Legalite	Legalite Corp., Boston.
Fracto	Crow Levick Co., Philadelphia.
Mac No-Glare	F. F. MacLean & Co., Syracuse.
Perrin No-Glare	Perrin Mfg. Co., Detroit.
Osgood	Osgood Lens & Supply Co., Chicago.
Omolite	Omolite Co., Jamestown, N. Y.
Holophane	Holophane Glass Co., New York.
Crockett	C. W. & C. H. Crockett, Troy, N. Y.
Rite Ray	Reflex Co., Newark, N. Y.

Doble Making Munitions of Secret Nature

DETROIT, Aug. 1—The General Engineering Co. and the Doble-Detroit Steam Motors Co. are engaged in munitions manufacturing of secret nature, as is evidenced by the exemption of some employees.

Sheepshead Bay Race Meet Scheduled

NEW YORK, July 31—A race meet is being planned by W. H. Wellman to be held on the Sheepshead Bay Speedway Aug. 18. Though no application for a sanction from the A. A. A. has as yet been made, it is stated that a 100-mile sweepstakes will be one of the races.

Electric Car Sales Stimulated

England Buying More of These Vehicles on Account of Gasoline Shortage

LONDON, July 21—One of the newest developments in the automobile field brought about by the present war is the extensive use made of electric vehicles for delivery service in city areas. This increased interest in electrics has been stimulated by the shortage and high price of gasoline, and also by the fact that electric delivery vehicles can be handled much better by girls and boys who are doing this service than the more complicated gasoline delivery vehicles. It is impossible at this time to definitely forecast the possibilities of this turn toward the electric in city areas, but with the continuance of the war there is no doubt but that a very pronounced revival of the electric will be witnessed.

Another unusual war condition in the motor truck field is using gas bags on the tops of trucks for fuel.

New Company Takes Over Pathfinder

INDIANAPOLIS, Aug. 1—The Pathfinder Motor Co. of America, formed last week in Delaware with a capital of $2,000,000 preferred and common of no par value, has completed negotiations for refinancing the concern. The new company buys the Pathfinder company outright and will begin immediately to make improvement and to carry on increased business.

The company, it is stated, will add the manufacture of trucks to its line.

The stock of the new company is divided into 500,000 shares of preferred and common stock, the common with no par value. Arrangements have been completed with Hynson, Derr & Co., New York bankers, for financing to the extent of the full capital stock.

Officers of the new company are: Charles McCutcheon, Indianapolis, president; Fred C. Dorn, Cleveland, vice-president; Paul N. White, Indianapolis, secretary and treasurer. The directors are as follows: C. J. Root, Terre Haute, chairman; Crawford Fairbanks, Terre Haute; A. C. Brown, St. Louis; William A. Umphries, Indianapolis; Paul N. White, Indianapolis; Charles McCutcheon, Indianapolis, and George H. Mosher, Los Angeles, Cal.

The officers of the old company were: William C. Teasdale, Jr., president; W. E. Stalnaker, vice-president; Wayne K. Bromeley, secretary and treasurer, and Karl Feilcke, chief engineer.

Cleveland's Makers May Test Cars in Streets

CLEVELAND, July 23 — Automobile manufacturers may test their cars in the streets of East Cleveland. An ordinance passed recently by the city council of East Cleveland declaring it unlawful to test cars on public streets "before sale" was pronounced unconstitutional by Common Pleas Judge Gott. An employee of the Chandler Motor Car Co. that had been arrested for violation of the ordinance was released. It was stated that no discrimination between car testing before and after sale was possible, and a new trial was denied.

$28,750,000 Profits for G. M.

11 Months' Report Shows Sale of 169,415 Cars and Trucks Totaling $185,750,000

NEW YORK, July 31—The General Motors Co., in its report for the 11 months ending June 30, 1917, shows profits of $28,750,000 as compared with $24,862,198 in 1916 and $11,686,281 in 1915. Gross sales amounted to approximately $185,750,000, compared with $145,159,746 and $85,801,189 in the two previous years, respectively. Undivided profits were $28,750,000, compared with $24,862,198 and $11,686,281 for the two previous years respectively.

The operations and earnings for the 3 months ended June 30 show a large gain compared with the 8 months previously reported, the total for the 11 months of 1917 exceeding the figures realized for the entire fiscal year ended July 31, 1916.

While the month of July will show a light falling off in volume due to the completion of current schedules and closing down for inventories, it is predicted that profits for the 12 months will exceed $30,000,000.

The cash in banks and in sight drafts with document attached at this date amounts to approximately $16,500,000. While nearly $7,000,000 less than figures last reported, stocks of materials necessary to protect the coming year's production have been increased nearly $15,000,000.

Sales of cars and trucks increased over 33⅓ per cent over the previous 11 months amounting to 169,415 as against 121,113. The 1915 sales totaled 68,604.

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$905,395 Surplus for U. S. Rubber

NEW YORK, July 30—United States Rubber Co. and its subsidiaries have a surplus of $905,395 for the quarter ended March 31 after payments of preferred dividends of $2,131,497.

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Kent Companies Merge

KENT, OHIO, July 27—The Falls River Co. has taken over entirely the plant and business of the Kent Machine Co., Kent. The Kent Machine Co. for the past 10 years has built and marketed concrete mixers, which line will be continued and other products added from time to time.

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C. A. S. Products Co. Prospering

COLUMBUS, July 28—The C. A. S. Products Co. of Columbus, which makes automobile steering gears, held its annual meeting last week when reports that were presented showed that the past year has been a very successful one. An increased output of the plant has been sold up to December and other business that the company expects to get soon will keep the plant going full time for the next 12 months. J. W. Graham was elected president and general manager and A. W. Tyler, secretary and superintendent.

An initial dividend of 2 per cent was declared on common stock to stockholders of record July 23, payable Aug. 15. A semi-annual dividend of 3½ per cent on preferred stock also was ordered paid. Extensive plans for enlarging the plant on Kaiser Street are being made and work may start within the next 60 days. By this addition the production of motor truck parts will be greatly increased.

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U. S. TO INVESTIGATE LATIN-AMERICAN ADVERTISING

WASHINGTON, July 28—For its forthcoming investigation of the advertising methods in vogue in Latin America, the Bureau of Foreign and Domestic Commerce, Department of Commerce, has chosen as its agent J. W. Sanger, a practical advertising investigator, counsel and writer of New York.

Before leaving this country the special agent will devote 2 months to visiting manufacturers, exporters, advertising agents and others who desire to learn something about advertising in South America and who have suggestions to make as to the scope of the investigation.

Manufacturers and others who wish to consult Mr. Sanger may address their inquiries to the Division of Commercial Agents, Room 409 Customhouse, New York City.

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N. A. C. C. Issues Publicity Helps

NEW YORK, Aug. 2—The National Automobile Chamber of Commerce has received many favorable comments regarding its circular letter on Proposed Campaign of Constructive Publicity. It has just issued to its members some very valuable suggestions along this line, covering some of the pitfalls that befall the publicity agent. It has also gathered together statistics relating to the industry which may be used by the advertising department as suggestions for development in publicity items.

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Await Announcement of Australian Luxuries Board Policy

SYDNEY, AUSTRALIA, June 30—The automobile industry in Australia is more or less concerned over the fact that the Luxuries Board has not yet made any announcements as to its policy. The board has held secret sittings, so that no one has any intimation of what is going to take place and the veil of mystery is more disturbing than if public announcements were made.

Figures for the last 10 months of Australian trade show that imports are increasing at a rate to cause serious concern. The quantity has perhaps decreased, but with higher prices the increase in money is much ahead of former years, estimates placing it at $22,000,000. Clothing has cost this year 33 per cent more during the last 10 months than the corresponding months of a year previous. There has been shown no disposition to curtail luxuries in dress. The people in the streets are as well dressed as ever. The country has raised war loans and the money has come back in payment for services.

$29,704,773 Sales for Chevrolet

Sales Doubled in First 6 Months Amounting to 65,235 Compared with 32,514

NEW YORK, July 31—Sales during the first 6 months of this year for the Chevrolet Motor Co. have doubled the corresponding period of 1916 and nearly equal the whole of 1916. This company in today's report shows sales for the half year of 65,235 cars valued at $29,704,773. This record compares with 32,514 valued at $16,338,585 for the first half of 1916 and 69,690 cars valued at $31,877,375 for the whole of 1916.

Of the $64,004,800 capital stock issued $20,604,800 was on account of operations and $43,400,000 for investment. Included among the latter are 450,000 shares, a controlling interest in the common stock of the General Motors Corp.

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Springfield Body to Increase Capital

NEW YORK, July 27—The stockholders of the Springfield Body Corp. have approved a plan to increase the capital stock to $3,250,000, of which $750,000 will be 8 per cent cumulative first preferred stock, $1,000,000 8 per cent cumulative second preferred, and $1,500,000 common. Subscriptions have been asked for the first preferred stock.

It was stated at the special meeting of the stockholders that the company was protected for all raw materials to the extent of orders booked. The company, in addition to having open and closed body contracts, is negotiating for the manufacture of airplane parts.

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Safety and Sanitation Congress Sept. 10

NEW YORK, Aug. 2—In view of the changed conditions that are being brought about in numerous factories by the National draft, the matter of safety of employees, especially novices who are to take the places of those who enlist, has become a national problem of considerable importance, and with this idea foremost in mind, a huge Safety and Sanitation Congress has been called to take place in New York City, Sept. 10-15. It will be the largest congress of this nature ever held and delegates from all over the world will attend to discuss matters pertaining to the promotion and standardization of safety methods in factories, railroads, and the various industries in which hazardous occupations are found.

Coincident with the Congress there will be staged the largest Safety and Sanitation Exposition in history, three large floors of Grand Central Palace being used for this. The National Safety Council and the American Museum of Safety will co-operate in staging this. Thousands of safety devices and demonstrations of accident prevention will be on view. The exposition will be open to the public for 1 week.

Fisher Bodies for Airplanes

10-Acre Plant To Be Erected in West Detroit in Sections—First Order 500

DETROIT, July 31—The Fisher Body Corp. is erecting in West Detroit a plant which will cover 10 acres, intended particularly for airplane body manufacture. The planes will be made here and the engines supplied by the Government from other plants. It is intended to make, assemble and fly the airplanes in the Fisher organization, and to turn them back to the Government complete. The initial Fisher order is for 500 planes, totaling $5,000,000, which is in the nature of a trial and after this order has been completed to the satisfaction of the Government, there is no limit set as yet on what will eventually be turned out.

This 10-acre plant will be erected in sections by the Fisher Body Co. itself, and each section will be of standard size and of standard construction, so that the plant can be added to at any time while the airplanes are under construction in the units already set up.

The purchasing and experimental offices have been installed in the old Bour-Davis plant at Fort and Twenty-third Streets, Detroit, on the top floor. The Hinkley Motors Corp. in which the Fishers and Mendelssohns are financially interested occupy the bottom floors. The type of plane built by the Fisher Co. is the Dayton-Wright machine, and the chief engineer of the Dayton-Wright Co. is at present in Detroit, arranging the preliminary details of manufacture.

The staff of the Fisher Body Co., taking care of the airplane work, has been taken from the body plant and released from all duties in connection with it. The purchase of supplies and materials is already going on and several sections of the 10-acre plant will be in operation in 60 days.

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FINANCIAL

Maxwell May Pay First Preferred Dividend Only

DETROIT, July 30—It is possible that the directors of the Maxwell Motor Co. at their dividend meeting in August will vote to suspend dividends both on the $12,778,000 common stock and on the $10,127,000 second preferred. This latter is not cumulative and this is an argument in favor of suspension. The 10 per cent common dividend has been a question for the past 6 months and as far back as January it was believed that this dividend would be continued through 1917, but this was before the entrance of the United States into the war.

If the Maxwell company passes these dividends it will mean a cash saving of $1,900,000 per annum and at present with the unsettled conditions, it is believed that saving this amount would be a wise move. The Maxwell company has not accumulated a big debt and has not up to the present piled up an undue amount of cars. Passing its dividends would to the greatest extent be a precautionary measure and is a step which the immediate future appears to make not only wise but compulsory from a standpoint of good business.

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Studebaker Sales Gain

SOUTH BEND, IND., July 30—Sales of the Studebaker Corp. for the past 5 weeks are reported to have shown a steady improvement and officials of the company expect that this will continue. Inventory figures as of June 30 are being completed and will be submitted to the meeting of the board on Aug. 7. A detailed statement of earnings for the first half of the year will be made up and on this the directors will base their decision regarding the common dividend. The company has a floating debt of about $11,000,000, but payments on the notes are being made this month and more will be paid off next month.

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International Truck Earns $9.10 a Share

NEW YORK, July 31—Earnings of the International Motor Truck Corp. for the first half of the current year, to June 30, were in excess of $400,000, after interest charges, equivalent to about $9.10 a share on $4,243,771 7 per cent cumulative first preferred outstanding.

This is at the annual rate of $18.80 a share, but interests close to the company feel that the last half of the year will show even better results, as May and June earnings were the largest months.

The financial position is probably the best in the company's history, cash being in excess of $1,300,000 and, with notes and accounts receivable, quick assets amount to more than $2,750,000. Accounts and notes payable are about $1,800,000, leaving net quick assets close to $950,000. Accounts and notes payable item is made up mainly of $1,500,000 two-year notes, recently sold.

The inventory position is strong, raw material and finished and unfinished trucks amounting to approximately $3,750,000. This, added to net quick assets of $950,000, leaves working capital at about $4,700,000.

Shipments in the first half of the year were about 625 trucks greater.

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$5,200,000 ½-Year Net for Goodrich

NEW YORK, July 28—The B. F. Goodrich Rubber Co., Akron, reports net earnings for the first 6 months of this year as approximately $5,200,000, compared with $4,800,000 in the first half of the preceding year. Gross sales are understood to be running at rate of about $85,000,000, a new sales record, and comparing with $70,990,782 in 1916.

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Dayton to Add New Wheels

DAYTON, OHIO, July 30—The Dayton Wire Wheel Co., which has been manufacturing wire wheels for Fords since Jan. 1, is planning to manufacture additional models in the near future for all makes of cars.

Airplane Stocks Are Features

Motorcycle Issues Strong—Automobile Stocks Still Weak—General Motors Report

NEW YORK, July 31—Airplane and motorcycle issues last week featured the automotive stocks in Wall Street and the Curb. Curtiss Aeroplane rose 9 points. Hendee motorcycle stock is this week 7 points higher on account of promise of future large war orders. Automobile issues are still weak with little business being transacted.

General Motors was the strongest of the motor group on reports from Detroit to the effect that that company is rushing its parts makers for early deliveries on account of participation in government airplane orders. General Motors has just made a record report for 11 months as has Chevrolet for 6 months.

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DIVIDENDS DECLARED

B. F. Goodrich Rubber Co., quarterly of $1.75 per share on preferred, payable Oct. 1 to stock of record at close of business, Sept. 21 and $1 per share on common, payable Nov. 15 to stock of record at close of business Nov. 5.

Day-Elder Motors Corp. semi-annual of 4 per cent on preferred, to stock of record June 30, Payable Aug. 1.

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Stock Increase for Hood Rubber

NEW YORK, July 28—Stockholders of the Hood Rubber Co. yesterday voted to issue $1,250,000 additional preferred stock and $500,000 common stock. Common stockholders will receive right to subscribe for one share of new common stock for every share now held. The authorized preferred stock was increased to $5,000,000, and authorized common to $1,000,000, therefore company will have in treasury $1,000,000 unissued preferred stock and $500,000 common.

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NEW COMPANIES

LANSING, MICH., July 31—Henry Ford & Son, Dearborn, Mich., manufacturers of the Ford tractor, have been incorporated with $1,000,000 capital, all paid in. The concern is strictly a family affair and the 10,000 shares of $100 par stock are held as follows: Henry Ford 3333, Clara J. Ford 3334, Edsel Ford, 3333.

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DETROIT, July 31—The Pioneer Trailer Corp. has been incorporated with a capital of $30,000.

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MINNEAPOLIS, July 31—Federal Tractor Co., Inc., is the new name of the Tom Thumb Tractor Co., which has been reorganized with increased capital to carry on the manufacture of a full line of creeping farm tractors on a large scale of production. A temporary plant is being operated in St. Paul and work on

the construction of a large plant will soon be under way somewhere in the southwest. Albert O. Robbins is sec.-treas.

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NEWARK, N. J., July 27—Western Aero Corp., capitalized at $250,000 to manufacture airplanes, engines, etc. C. W. Johnson, Jersey City; G. A. Eckstardt, Newark, and J. W. Eckstardt, Orange, are the incorporators.

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DOVER, DEL., July 27—The Electric Auto Lite Corp., capitalized at $1,300,000 to deal in and manufacture engines, has been incorporated.

Other incorporations include the Silent Valve Motor Corp., capitalized at $3,500,000 and the National Tractor Co., capitalized at $2,500,000.

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GRAND RAPIDS, MICH., July 30—The Universal Auto Top Co., with $25,000 capital subscribed, has incorporated to manufacture the Universal top, for which patents have been secured. Incorporators are William E. Pugsley, Leon S. Carrol, Clyde Vanderberg and Robt. H. Luce.

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ST. LOUIS, MO., July 30—H. B. Krenning, who recently disposed of most of his interest in the Dorris Motor Car Co., announced this week the organization of the One-Wheel Truck Co., of which he is president. This company will manufacture a truck which will be marketed under the name of the Auto Horse, and which hauls up to 5 tons.

B. R. Parrott is designing engineer. A peculiar mobile power is given to the truck by the fact that it is balanced on one wheel, 34 by 5, and can turn completely around without moving its load.

The formation of the new company was announced when the purchase of the machine shop of the Roth Tool Co. at 2122 to 2128 Chouteau Avenue had been completed. This shop, 130 by 240, will be used as an assembly plant and finishing shop. Charles A. Marien will be factory superintendent and assistant to the president. Walter G. Vollmer will be efficiency expert.

The incorporators of the new company are men of considerable wealth. Aside from President Krenning, they are Otto F. Stifel, vice-president, a financier and brewer; Louis Goodhard, secretary; and J. D. Howe, attorney, is treasurer. B. R. Parrott, the designer, is a director.

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MILWAUKEE, WIS., July 29—James R. Petley, 503 Germania Bldg., a large dealer in factory and mill supplies, has organized the Petley Rubber Co. of Milwaukee, with a capital stock of $100,000.

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WALKERVILLE, ONT., Aug. 1—The Motor Products Corp., Ltd., Walkerville, Ont., has been incorporated for $500,000. The incorporators are: J. H. Coburn, A. J. Gordon, and W. L. McDowell.

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LANSING, MICH., July 31—The Novo Engine Co. has increased its capitalization to $1,000,000 and has declared a 200 per cent stock dividend with a cash dividend of 10 per cent.

Officers elected were: President, R. H. Scott; vice-president and general manager, Clarence E. Bement; secretary, Harry C. Teel; treasurer, Donald E. Bates; assistant secretary, B. R. Hoadley; assistant treasurer, E. J. Bement; general superintendent, Eric Teel. The latter and the first four officers named constitute the board of directors. In the election of officers Clarence E. Bement is advanced from secretary to vice-president.

The annual report shows that the 1916 business was the company's record. The company, in its 1916 building campaign, expended $250,000 in increasing its manufacturing facilities. The payroll has increased 50 per cent in the past 12 months.

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NEWARK, N. J., July 27—A. C. Belknap, Inc., has been incorporated for $100,000 to manufacture engines, automobile parts, etc. A. C. Belknap, East Orange; Frank Van Syckle and Harold Van Syckle, Perth Amboy, are the incorporators.

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Bailey Differential Co. Awards Prizes in Letter Contest

CHICAGO, July 31—The most sensible letter on the advantages of the Bailey non-stall differential was written by E. W. Huber, tool room foreman, Timken-Detroit Axle Co., Detroit. Mr. Huber was adjudged the winner of the contest conducted by the Bailey Corp. and won the first prize of $500 of a total of $1,000 offered. Judges were F. E. Edwards, formerly technical representative contest board American Automobile Assn.; Leroy Hillman, Chicago representative contest board American Automobile Assn., and Darwin H. Hatch, Editor *Motor Age*. Second prize was awarded to Miss S. Fulwood, employed in the office of one of the largest motor manufacturing plants in Detroit.

After the judges had passed on the letters a second contest was conducted, in which the best of the letters were supplied to the public and prizes offered to those who could pick out most nearly in their order.

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	66	67	—1
*J. I. Case T. M. Co. pfd.	76	84	..
Chalmers Motor Co. com.	9	12	..
Chalmers Motor Co. pfd.	..	..	..
*Chandler Motor Car Co.	80½	81½	+ ½
Chevrolet Motor Co.	91	94	—3
Fisher Body Corp. com.	38	40	—5
Fisher Body Corp. pfd.	85¼	88	+ ¼
Fisk Rubber Co. com.	74	76	..
Fisk Rubber Co. 1st pfd.	103	105	..
Fisk Rubber Co. 2nd pfd.	92	95	..
Firestone Tire & Rubber Co. com.	117	121	—3
Firestone Tire & Rubber Co. pfd.	103	105	..
*General Motors Co. com.	112⅛	113¾	—2½
*General Motors Co. pfd.	86	88	+1½
*B. F. Goodrich Co. com.	50¼	50½	—4⅛
*B. F. Goodrich Co. pfd.	105	106	+1
Goodyear Tire & Rubber Co. com.	198	201	+1
Goodyear Tire & Rubber Co. pfd.	105	107	..
Grant Motor Car Corp.	3	5	..
Hupp Motor Car Corp. com.	2½	3½	..
Hupp Motor Car Corp. pfd.	72	80	..
International Motor Co. com.	5	10	..
International Motor Co. 1st pfd.	30	50	..
International Motor Co. 2nd pfd.	10	20	..
*Kelly-Springfield Tire Co. com.	46	49	— ¾
*Kelly-Springfield Tire Co. 1st pfd.	87	95	—1
*Lee Rubber & Tire Corp.	21	21½	+ ¼
*Maxwell Motor Co., Inc. com.	33¾	34	— ½
*Maxwell Motor Co., Inc. 1st pfd.	61	63	—2
*Maxwell Motor Co., Inc. 2nd pfd.	24	24¼	—2
Miller Rubber Co. com.	170	175	—5
Miller Rubber Co. pfd.	102	104	..
Packard Motor Car Co. com.	125	133	..
Packard Motor Car Co. pfd.	93	97	—1
Paige-Detroit Motor Car Co.	25	27	..
Peerless Truck & Motor Corp.	13	14	—1
Portage Rubber Co. com.	148	150	—2
Portage Rubber Co. pfd.	..	..	..
Regal Motor Car Co. pfd.	..	22	..
Reo Motor Car Co.	26	27	+1
*Saxon Motor Car Corp.	18	19½	+1¼
Springfield Body Corp. com.	5	15	..
Springfield Body Corp. pfd.	20	50	..
Standard Motor Construction Co.	10	12	—1
*Stewart-Warner Speed. Corp.	63	65	..
*Studebaker Corp. com.	53¾	54⅛	— ⅝
*Studebaker Corp. pfd.	..	96	..
Swinehart Tire & Rubber Co.	..	65	..
United Motors Corp.	23¼	23½	— ⅞
*U. S. Rubber Co. com.	61	62	+1½
*U. S. Rubber Co. pfd.	105¼	107	— ¾
*White Motor Co.	46¼	47	+ ¼
*Willys-Overland Co. com.	32⅜	32½	+1⅜
*Willys-Overland Co. pfd.	94	96½	—2

*At close July 30, 1917. Listed New York Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

	Bid	Asked	Net Ch'ge
ACTIVE STOCKS			
Auto Body Co.	..	29	..
Bower Roller Bearing Co.	..	37	..
Chevrolet Motor Co.	89	94	—1
Commerce Motor Car Co.	..	10½	..
Continental Motor Co. com.	6⅜	6½	..
Continental Motor Co. pfd.	..	..	..
Edmunds & Jones com.	..	..	..
Ford Motor Co. of Canada	220	..	..
Hall Lamp Co.	..	23	..
Hayes Mfg. Co.	..	..	..
Michigan Stamping Co. com.	..	14¾	..
Motor Products	..	..	..
Packard Motor Car Co. com.	..	132	..
Packard Motor Car Co. pfd.	94¼	..	+ ¼
Paige-Detroit Motor Car Co.	..	25¾	..
Prudden Wheel Co.	..	24	—1
Reo Motor Car Co.	25¾	27	— ¼
INACTIVE STOCKS			
Atlas Drop Forge.	38	41	..
Kelsey Wheel Co.	82	..	..
Regal Motor Car Co. pfd.	..	26½	..

Personals

John N. Willys has been appointed surveyor to the King of Spain and is the first American automobile maker to have such a title from a European monarch. The title is the result of the King's satisfaction with seven Willys-Knight cars.

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Clarence A. Pfeffer, formerly vice-president of the Chalmers Motor Co., has been appointed comptroller of the Saxon Motor Car Corp., Detroit. Mr. Pfeffer's appointment is in line with the consummation of the refinancing plans which have been previously discussed.

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D. W. James, formerly assistant to John Willys, and who retired 2 years ago on account of poor health, has rejoined the Willys organization. He will be connected with the Denver branch of the Willys-Overland, Inc.

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Carl E. Lipman, head of the Lipman Mfg. Co., Beloit, Wis., a large maker of air, oil and water compressors and pumps, including units for cars and trucks, has organized the Lipman Refrigerator Car & Mfg. Co., capital stock, $500,000, which will build a large plant in Beloit during the next 6 months to manufacture refrigerator cars and install freezer systems in existing railroad rolling stock.

—

John S. Speck has been appointed factory engineer and assistant chief engineer of the United States Motor Truck Co., Cincinnati. Mr. Speck for 6 years has been the factory engineer of the Federal Motor Truck Co., Detroit.

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Chas. F. Bronson has become treasurer of the Buffalo Pressed Steel Co., Buffalo, N. Y. He was formerly in the executive department of the Keystone Watch Case Mfg. Co., Newark, N. J.

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B. A. Herrington has become president of the Aero Cushion Tire Co., San Jose, Cal. This company has gone under new management and has made several other changes. A. P. Marston has become vice-president; W. P. Wohlheter, secretary; E. L. Sherbondy, general manager, and J. J. O'Shannessy, general agent. E. L. Sherbondy is the inventor of the Aero Cushion tire.

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Fred Haupt has been elected president of the Ten Broeck Tyre Co., Louisville, Ky., to succeed the late Harry L. Lewman. Mr. Haupt has been vice-president and was one of the organizers with Mr. Lewman. Winn Lewman has been elected general manager; W. N. Cox, treasurer, and Frank E. Trumper, secretary. All have been identified with the company for some time.

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Goodyear Tire & Rubber Co., Akron, has made following changes:

W. A. Hazlett, formerly manager of the Detroit branch, has been appointed manager of the Detroit district.

P. E. Ammon, who has been special dealers' representative of the Detroit district, becomes assistant to Mr. Hazlett.

H. G. Norris, formerly manager at Toledo, has been promoted to the management of the Detroit branch.

G. H. Hilbish has assumed charge of the Toledo branch, and is succeeded at Saginaw by Mr. W. D. McFarland, formerly a salesman in that territory.

F. W. Telford, who has been Goodyear manager at Des Moines, has been assigned to the manufacturers' division at Detroit.

R. E. Greene, former assistant manager at Minneapolis, succeeds Mr. Telford at Des Moines.

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Given Moore, formerly sales manager of the Wayne Mfg. Co., was announced as manager of the Kardell Tractor & Truck Co., the $1,000,000 corporation which will manufacture here the Four-in-One tractor invented by H. W. Kardell. The company plans to produce 300 tractors for sale this fall and 3000 next year.

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Frank W. Kurtz has been appointed western district manager for the Amazon Rubber Co., Akron. Mr. Kurtz will have headquarters in Chicago, and will direct the sale of Amazon antiblowout tires in the Central States.

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William H. Petit, with the Olympian Motor Co., Pontiac, Mich., has resigned to take a position with the Pan-American Co., Decatur, Ill., as engineer.

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Dwight S. Ritter, for 5 years connected with the buying department of the Nordyle & Marmon Co., Indianapolis, last week was made purchasing agent, a newly created position. Previous to his connections with the company, Mr. Ritter was purchasing agent for the Columbus Buggy Co., Columbus.

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C. E. Frederickson, vice-president and general manager of the Famous Trucks Corp., St. Joseph, Mich., has resigned on account of pressing business interests in Chicago. For the present Frank N. Wilkinsin will act as manager.

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W. F. Backes, assistant manager of the San Francisco branch of the Studebaker Corp., has been made active manager, succeeding Earl R. Carpenter, who has been made manager of the Missouri branch.

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G. F. Cox will take charge of the New York service department of the Chase Motor Truck Co.

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L. W. Coppock, vice-president of the Higrade Motors Co., Grand Rapids, Mich., is to handle the commercial end of the business, including sales and advertising, acting as assistant to J. Elmer Pratt, president. Coppock will retain supervision over the engineering department, as formerly.

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W. C. Rowley has been appointed vice-president of the Federal Motor Truck Co., Detroit, and will have charge of sales.

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H. A. Condon, sales manager, and E. A. Haskins, production manager of Federal Motor Truck Co., have resigned to join the Detroit Truck Co. D. F. Whittaker has been made advertising manager of the Detroit Truck Co.

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W. F. McGuire, formerly production manager of the Ford company, has been elected vice-president of the Frank B. Stearns Co., Cleveland.

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Captain Roy B. Staver, formerly an officer of the Staver Carriage Co., Chicago, died in the Roosevelt Hospital, New York, July 31, on the eve of receiving a commission as Major Staver. He was a West Point graduate.

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OBITUARY

FLINT, MICH., July 28—James M. Martin, superintendent of transportation for the Buick Motors, died Wednesday night, after a long illness.

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ELECTIONS

WATERTOWN, WIS., July 30—The Lasure Friction Clutch Co., which succeeds the Lasure Clutch Co., Madison, Wis., and is now occupying its new works in Watertown, has elected the following officers: President, R. L. Richardson; vice-president, A. D. Platz; secretary-treasurer, B. M. Parsons; directors, A. M. Peltier and Edward L. Schempf. The new company is capitalized at $60,000.

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Johnson Introducing "Freeze-Proof" Product

RACINE, WIS., July 28—S. C. Johnson & Son, Racine, Wis., maker of automobile cleaning substances and accessories, is introducing "Freeze-Proof," a product to be poured into the radiator to prevent freezing of the water. One application to the radiator is said to last for the winter.

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Continental Stand for Engines

KNIGHTSTOWN, IND., July 30—A stand on which the engine may be placed for repairs is being marketed by the Continental Auto Parts Co., Knightstown.

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Marketing Genolite Starter for Fords

DETROIT, July 30—A new electric starting and lighting system is being put on the market by the Detroit Starter Co., maker of Versal products. The trade name of this system is Genolite.

Factory

Continental Motors Corp., Detroit, is making plans to open depots for parts and service in Boston, Philadelphia, Kansas City and Chicago. The great number of Continental engines in use throughout the country has led the makers to establish part stations in order to insure more prompt delivery of parts to distributors, dealers and owners of cars which are equipped with this motor.

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Des Lauriers Aircraft Co., recently incorporated, is planning to erect a factory near Jersey City, N. J. The capital is $5,000,000. The incorporators are Dijon de Waray of Newark, R. R. Kelly of Plainfield, N. J., and H. A. Dahlen of this city.

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Reo Motor Car Co., Lansing, Mich., completed the signing of the 1918 contracts with all dealers in the United States and Canada last Saturday. New contracts show a larger percentage of allotments.

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Abbott Motor Corp., Cleveland, formerly of Detroit, has taken full possession of its new Cleveland factory. The company leased a factory for 10 years at $13,082 with an option to purchase at any time for the cost of the land and building plus 6 per cent of the total.

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Motor Products Corp., Detroit, has sold the Rands Mfg. Co. plant at a figure in excess of its book valuation. The Rands plant has been used for the past 6 months by an outside company, and its sale in no way affects the production of the Motor Products Corp. The gross business of the Motor Products Corp., is now running at a rate of $10,000,000 per year with net earnings at $10 per share.

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Superior Steel Castings Co., Benton Harbor, Mich., has been awarded a contract for gun manufacture and is devoting its energy in that direction.

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Harroun Motors Corp., Wayne, Mich., has reduced its working force and production on account of shortage of certain materials. A batch of 500 cars is being worked through full parts being on hand for that number. It is expected that by the time these are finished sufficient supplies will be on hand to start an equal number through the shop. Ray Harroun has been in Washington during the past week, which is taken as an indication that the Harroun company seeks munition orders for which the Government guarantees sufficient material.

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T. & M. Mfg. Co., Oshkosh, Wis., which is the reorganization of the Termaat & Monahan Co., Oshkosh, gasoline and oil engines, machine tools, etc., has resumed operations on a full schedule after a recess, during which the financial affairs were readjusted under the direction of a receiver. Myron C. Kline, formerly manager of the Jacobson Machine Mfg. Co., Warren, Pa., is general manager of the plant. The company has orders amounting to $25,000 or more on its books and is receiving a large amount of new business.

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Triangle Motor Truck Co., St. Johns, Mich., has completed plans for a new building 70 by 236 ft., that will be finished about Sept. 1. At the start, the company will manufacture a 1-ton, and a 1½-ton truck.

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Wayne Steering Wheel & Bow Co.'s new factory at Wayne, Mich., is nearly completed, and the machinery will be installed in a few days.

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Fitzsimmons Steel Products Co., Milwaukee, has awarded contracts for the erection of a brick and steel shop addition, 75 by 150 ft.

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Prest-O-Lite Co., Indianapolis, has completed two additions at a cost of $150,000, adding 108,000 sq. ft. of floorspace. The additions, which are built of concrete and steel, are each three stories high, and form wings at each end of the company's plant that was erected last year. One structure is 100 by 160 ft., and the other is 100 by 200 ft. The plant now has a capacity of 500,000 batteries a year. A feature of the plant is the company's own box manufacturing establishment which now is in operation manufacturing boxes to be used in the shipment of Prest-O-Lite products. The company's production of storage batteries has been trebled in the last 3 years.

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Appleton Auto Body Co., Appleton, Wis., has increased its capital stock from $10,000 to $25,000 preparatory to erecting a complete new passenger car body plant. The present works, established in February, have been outgrown. Work will start Aug. 1 on a two-story fireproof factory, employing between sixty and seventy-five operatives. It will be ready Oct. 1. J. L. Tollefson and R. A. Schwartzburg have taken an interest in the company. Gustave Seeger is vice-president and general manager.

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Saxon Motor Car Corp., Detroit, has leased the plant at E. Lafayette and Meldrum Avenues, formerly occupied by the Abbott Motor Corp. This plant has 60,000 sq. ft. floorspace.

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Mayo Radiator Co., New Haven, Conn., has opened offices at 1852 Penobscot Building, Detroit. P. E. Jackson is western sales manager.

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Lee Tire & Rubber Co., Conshohocken, Pa., will remove its general offices to New York. All branches of the company's business, except the production department, are included in the transfer and, not later than Oct. 1, the sales, executive and accounting forces will be installed in New York headquarters.

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Curtiss Aeroplane Co. has purchased 90 acres of land in Buffalo, and anticipates the erection of a factory which will allow for the production of 9000 Curtiss aircraft before June, 1918.

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Wisconsin Duplex Auto Co., organized recently at Clintonville, Wis., with a capital stock of $500,000, has completed the first models of the new quadruple drive passenger and truck chassis.

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Racine Rubber Co., Racine, Wis., has awarded contracts and started work on a three-story addition, 100 by 700 ft., with a wing, 50 by 60 ft., and a new power plant, 50 by 75 ft. When these facilities are available, the output will be increased 25 to 35 per cent.

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Chalmers Motor Co. factory in Walkerville, Ont., recently gutted by fire has been temporarily replaced by a new frame structure covering 21,000 sq. ft.

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Reo Motor Car Co., Lansing, Mich., has purchased the plant and business of the Capitol Auto Co., Lansing, and will take possession Aug. 1. Clarence Triphegen, formerly with the Chevrolet, at Flint, will be in charge.

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Nordyke & Marmon Co., Indianapolis, will erect an addition to its plant which will be 300 by 90 ft. The company will also erect a one-story steel and glass addition, 300 by 210 ft., and the new structure will be added onto this building to provide a plant for the manufacture of airplane engines for the Government.

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Auto Shock Absorbing Co., Plymouth, Ind., has closed its plant in that city and the machinery and equipment has been moved to Chicago.

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Globe Motor Truck Co., East St. Louis, Ill., announced its readiness to enter the general market for the sale of trucks last week when a salesroom at Eleventh and Pine Streets, St. Louis, Mo., was leased. The four models of trucks made by the company will be placed on exhibit there at once. Walter F. Sheehan, vice-president of the company, has charge of the sales in this city. The Globe company is owned chiefly by St. Louisans and David F. Marks is president.

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La Crosse Tractor Co. is planning to make considerable use of the shipping facilities on the Mississippi River as rapidly as occasion may warrant. On July 21 the first tractor to be shipped in this way was loaded on the steamer Quincy, consigned to J. B. Gabeline, La Crosse distributor at Burlington, Iowa.

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Safety Truck Brake Co., Waukesha, Wis., has been organized with $20,000

capital by W. S. Halladay, J. T. Abel and Elmer L. Arnold to manufacture braking systems for motor trucks and similar purposes. It is intended to establish a plant in Waukesha.

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Neenah Brass Works, Neenah, Wis., has awarded contracts for the erection of a large foundry and shop addition costing about $20,000 with equipment.

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Simple Gas Engine Co., Ashland, Wis., manufacturing several types of light stationary and portable gas engines for farm and general utility purposes, has completed the removal of its plant and offices from Ashland to Menasha, Wis., and is now on a regular production schedule.

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Gilson Mfg. Co., Port Washington, Wis,. a large manufacturer of gasoline engines, implements, etc., has closed a contract with the Beeman Garden Tractor Co., Minneapolis, for the manufacture of 5000 of its "one-horse" garden tractors, delivery to begin Sept. 1.

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The Gray Motor Co., Detroit, will move into its new plant on Mack Avenue about Sept. 1. The new plant will double the output of the company. Light motor boat, truck and tractor engines are being manufactured.

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Oak Tire & Rubber Co., Ltd., Toronto, Ont., with factory at Oak Ville, Ont., is now manufacturing Royal Oak tires for automobiles.

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Lang Body Co., Cleveland, has purchased 5 acres of land near West 106th Street and Loraine Avenue. The first of a series of buildings will be erected, and used for the construction of automobile and airplane bodies. It will cost $100,000.

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Staver Motor Car Co., Chicago, will build a three-story, 110 by 157 ft. reinforced concrete factory.

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Pullman Plant Sold for $408,597

YORK, PA., July 26—The Pullman Motor Car Co.'s plant and other assets were offered at receiver's sale July 23 and were sold to New York and Philadelphia capitalists for $408,597. L. Goldstein & Sons, Philadelphia, bought the service department for $115,000; Michael Dwyer of New York, the completed cars for $53,597; Joseph Frankel, New York, the plant, machinery and their assets for $240,000. The plant will continue in operation.

Calendar

ASSOCIATIONS

Aug. 6-10—Convention at Atlantic City under auspices of Cycle Parts and Accessories Assn.
Sept. 25-28—Pittsburgh National Assn. of Purchasing Agents, Convention.

CONTESTS

Aug. 5—Billings, Mont., Track Race.
Aug. 17 — Flemington, N. J., Track Race.
Sept. 3—Uniontown, Pa., Speedway Race.
Sept. 3—Cincinnati, O., Speedway Race, Championship.
Sept. 6—Red Bank, N. J., Track Race.
Sept. 8—Hillclimb, Pike's Peak, for stripped stock chassis.
Sept. 15 — Providence, R. I., Speedway Race.
Sept. 22—Allentown, Pa., Track Race.
Sept. 28—Trenton, N. J., Track Race.
Sept. 29—New York Speedway Race.
Oct. 6 — Danbury, Conn., Track Race.
Oct. 6—Uniontown, Pa., Speedway Race.
Oct. 13—Richmond, Va., Track Race.
Oct. 13 — Chicago Speedway Race.
Oct. 27—New York Speedway Race.

S. A. E.

Aug. 6—Motorcycle Division, Atlantic City.

SHOWS

Aug. 6-10—Fremont, Neb., General Tractor Demonstration.
Sept. 2-9—Spokane, Wash., Interstate Fair.
Sept. 9-15 — Milwaukee Show, State Park Fair, West Allis.
Sept. 9-15 — Milwaukee, Wis., Fall Show, Wisconsin State Fair, West Allis, Milwaukee Automobile Dealers.
Oct. 1-6—Buffalo, N. Y., Closed Car Show, Automobile Dealers' Assn., Elmwood Music Hall.
Oct. 13-28—Dallas, Tex., Dallas Automobile & Accessory Dealers Assn. State Fair.

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Jan. 5-12 — New York Show, Grand Central Palace, National Automobile Chamber of Commerce.
Jan. 19-26—New York, Motor Boat Show, Grand Central Palace, National Assn. of Engine and Boat Manufacturers.

Engineering

American Railway Master Mechanics' Assn.
American Institute of Electrical Engineers.
Master Builders' Assn.
American Society of Heating and Ventilating Engineers.
Association Iron and Steel Electrical Engineers.
Mining and Metallurgical Society of America.
Society of Automotive Engineers.
Illuminating Engineering Society.
National Electric Light Assn.
National Gas Engine Assn.
American Society for Testing Materials.
American Institute of Metals.
American Foundrymen's Assn.
Society Naval Architects and Marine Engineers.

AUGUST

4—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
11—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
20—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

SEPTEMBER

1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
10-14—Assn. Iron & Steel Elec. Engrs. annual convention at Phila.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
20—Mining & Met. Soc. of Amer. monthly meeting N. Y. section at Engrs. Club.
24—Amer. Inst. Metals at Boston.
24—Amer. Fdry. Assn. annual meeting at Boston.

OCTOBER

6—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
13—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
15—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
17-18-19—Amer. Gas Inst. at Washington, D. C.
18—Mining & Met. Soc. Amer. monthly meeting New York section Engrs. Club.
20—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

NOVEMBER

3—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penna. section at Phila.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
10—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
15—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.
15-16—Soc. Naval Arch. & Marine Engrs. annual meeting.
17—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
19—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

DECEMBER

1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn section at Phila.
14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
20—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.